

# **Exhibit G1**

## **Public Redacted Version**

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**UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA  
SAN FRANCISCO DIVISION**

IN RE GOOGLE PLAY STORE  
ANTITRUST LITIGATION

THIS DOCUMENT RELATES TO:

*In re Google Play Consumer Antitrust  
Litigation*, Case No. 3:20-cv-05761-JD

*State of Utah et al. v. Google LLC et al.*,  
Case No. 3:21-cv-05227-JD

Case No. 3:21-md-02981-JD

**DEFENDANTS' REPLY IN SUPPORT OF  
MOTION TO EXCLUDE MERITS  
OPINIONS OF DR. HAL J. SINGER**

**[PROVISIONALLY UNDER SEAL]**

Judge: Hon. James Donato  
Date: August 3, 2023  
Time: 10:00 a.m. Pacific Time  
Courtroom: 11, 19th Floor, 450 Golden Gate  
Ave, San Francisco, California,  
94102

## INTRODUCTION

Plaintiffs’ opposition confirms that Dr. Singer’s opinions regarding injury and damages cry out for this Court to exercise its obligation to act as a gatekeeper and exclude them.

Dr. Singer’s pass-through formula purports to estimate the prices that developers would have charged if Google charged lower service fees. For decades, the Supreme Court and other courts have recognized the economic complexities associated with estimating when firms pass through higher costs by raising prices. Dr. Singer has admitted both the economic complexities of estimating developers’ pass-through—and his failure to account for them. He concedes that a logit model assumes proportional substitution, but admits that the products he modeled are not substitutes. He agrees that focal point pricing is important, but cannot point to any analysis accounting for the █% of transactions at prices ending in “99.” He testified that the extent of pass-through depends on developers’ marginal costs, but admits he has not measured them.

Plaintiffs cannot run from Dr. Singer’s testimony, so they attempt to hide behind jargon and denial. Unable to dispute that apps in each Google Play store category are not proportional substitutes as logit requires, Plaintiffs simply relabel the categories as “economically reasonable groupings of consumer tastes.” Opp. at 8. But Plaintiffs never explain what these words mean. Faced with Dr. Singer’s concession that focal point pricing is “important” and their own expert’s opinion that “some firms would not change price in response to a change in the commission rate,” Plaintiffs only offer a footnote accusing Google of “selectively quot[ing]” and “mischaracteriz[ing]” testimony. *Id.* at 10 n.8. The transcripts speak for themselves. Lacking any response to Dr. Singer’s concession that it is “generally accepted” that pass-through is proportional to developers’ other marginal costs, Plaintiffs argue that these costs “drop out” of his pass-through formula. *Id.* at 11. In other words, Plaintiffs’ argue that Dr. Singer’s formula is reliable *because* it does not consider what “generally accepted” economics indicates must be considered. That flips the *Daubert* standard on its head.

Plaintiffs’ opposition also fails to save their alternative damages theory that Google would have offered users more valuable Play Points. Plaintiffs do not dispute that most users do not sign up for Play Points in the real world. And Dr. Singer testified that his Play Points model cannot

determine whether an individual user would have signed up for Play Points and that he has not done any analysis of how valuable Play Points would have to be for users to change their behavior. Plaintiffs' assertion without evidence that it is still a "safe inference" that all users would have signed up for Play Points has no place in a jury trial.<sup>1</sup> Opp. at 14.

## ARGUMENT

### **I. THE COURT SHOULD EXCLUDE OPINIONS BASED ON DR. SINGER'S FORMULA FOR PASS-THROUGH INJURY AND DAMAGES.**

Dr. Singer's own testimony shows that his pass-through formula ignores what he concedes are standard economic principles.

#### **A. Plaintiffs Cannot Show That a Key Assumption of a Logit Model Holds.**

Dr. Singer derived his pass-through formula from a logit model of demand. The logit model makes very specific assumptions about the relationship between prices, demand, and competition. Dr. Singer's own testimony shows that these assumptions do not hold as to how developers set prices for the products he has studied. This undermines his entire pass-through formula: without a reliable foundation in how developers would set prices, Dr. Singer's formula cannot reliably estimate the prices that developers would have charged without Google's conduct.

Plaintiffs do not dispute that a logit model depends on the irrelevance of independent alternatives, or IIA, property: the products whose demand is being studied must be substitutes in proportion to their shares. Dr. Singer repeatedly testified to this feature of logit models and cited literature confirming it. Plaintiffs also do not argue that apps in each category in the Google Play store are substitutes in proportion to their shares of the category. Dr. Singer has testified that this is not true. MDL Dkt. No. 487-8 ("Ex. 7, Singer Dep.") at 158:14-16 ("Q. Is it your opinion that all apps in each Google Play app category are substitutes? A. No."); MDL Dkt. No. 487-6 ("Ex. 5, Tr. of Hr'g, July 19, 2022") at 116:13-16 ("And is it your opinion in this case that all apps in every Google Play category are substitutes in perfect proportion to their share? DR. SINGER: Not in

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<sup>1</sup> On May 12, 2023, Plaintiffs served a supplemental report of Dr. Singer in which, for the first time, he calculated damages for class representatives and other individual plaintiffs. Google reserves all rights with respect to this supplemental report, including as to this *Daubert* motion.



perfect proportion.”). Plaintiffs confirm this with their strained suggestion that Quickbooks and Thumbtack are “substitutes” because a user could find an accountant through Thumbtack, “which a user could employ rather than buying QuickBooks,” Opp. at 8. The Yellow Pages is not a substitute for a hospital because one can use it to find a doctor.

In short, three undisputed facts require exclusion of Dr. Singer’s formula: there is no dispute that the formula is based on logit demand; there is no dispute that proportional substitution is a requirement of a logit demand model; and there is no dispute that this proportional substitution does not exist here. Excluding Dr. Singer’s model on that basis makes sense: if each app is not a substitute in proportion to its share of a category, that share cannot be used to predict prices.

Plaintiffs’ counterarguments fail. *First*, Plaintiffs argue that Dr. Singer’s regressions “confirm logit’s fit” and “that logit describes demand within each app category well.” Opp. at 6-7. But Dr. Singer could not cite any economic literature that goodness of fit is a proper way to test for proportional substitution, Ex. 7, Singer Dep. at 105:8-106:23, and Plaintiffs do not cite any such literature in their opposition. Plaintiffs therefore carefully avoid actually arguing that Dr. Singer’s regressions demonstrate proportional substitution. They instead point to Dr. Singer’s statement that “goodness of fit will tell you if the Logit is . . . the relevant way to describe preferences in substitution patterns here.” Opp. at 7. But that is bald assertion. Plaintiffs must *show* that Dr. Singer’s opinion about the “relevant way” to test logit is supported by economic literature. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 144, 146 (1997) (opinion based only on “*ipse dixit* of the expert” not reliable). Plaintiffs cite none.

Plaintiffs get nowhere by arguing that Dr. Singer’s regressions show “a negative and highly significant relationship between price and share.” Opp. at 6. Their own expert, Professor Rysman, testified that this does not indicate that logit is appropriate. MDL Dkt. No. 487-4 (“Ex. 3, Rysman Dep.”) at 68:21-69:2. Plaintiffs’ only response is that Dr. Rysman “had not read Dr. Singer’s report.” Opp. at 7 n.5. Plaintiffs seem to be asking the Court to disregard their own economic expert’s sworn testimony about principles of economics because that opinion was unvarnished. Plaintiffs do not explain why such an opinion is not reliable.

*Second*, Plaintiffs argue that “[s]ubstantial record evidence [] supports that Google’s app

categories meaningfully organize substitution.” Opp. at 8. Plaintiffs do not explain what this means or why it is relevant. Notably, they do not argue that the record evidence they cite actually shows proportional substitution—and for good reason. A note on the Help page for the Google Play store that “[c]ategories and tags help users to search for and discover the most relevant Apps,” *id.*, says nothing about proportional substitution among apps within a category or whether an app’s share of its category reliably predicts the developer’s price. A grocery store has signs that tell customers what products are in each aisle, but that does not mean that every product in each aisle is a substitute for every other product. If chips, cereal, and sodas are in Aisle 5, asking what percentage of sales from that aisle are for Cheerios is not going to be informative about their price. Plaintiffs also do not even try to explain how evidence that Google “uses the categories for its own internal analyses of [REDACTED] and [REDACTED],” *id.*, shows proportional substitution or makes using the categories a reliable way to assess how developers set prices.

The Court previously found it “worth noting” that Professor Daniel McFadden used app categories in a damages model the Court excluded in the parallel litigation against Apple. *In re Google Play Store Antitrust Litig.*, 2022 WL 17252587, at \*11 (N.D. Cal. Nov. 28, 2022). Plaintiffs now concede that Dr. McFadden’s report is irrelevant because it has nothing to do with logit demand. Opp. at 6 n.4. Plaintiffs do not explain why an economist who won a Nobel Prize in part for work on logit did not use logit to estimate pass-through as Dr. Singer did.

*Third*, Plaintiffs argue that, even if “proportional substitution is not strictly satisfied,” Dr. Singer’s “model provides a reasonable estimation of competition within the category” and Google Play’s “categories represent economically reasonable groupings of consumer tastes for different varieties of Apps.” Opp. at 8. But Plaintiffs cite no evidence for that bare assertion. Plaintiffs must *show* that Dr. Singer’s use of logit with Google Play’s categories is reasonable by *showing* that substitution of apps within a category is sufficiently proportional to make logit reliable. *See Joiner*, 522 U.S. at 144. Dr. Singer did not test that issue using any method recognized by a single piece of economic literature. It does not matter whether “logit is widely used to estimate pass-through in a variety of contexts.” Opp. at 9. Plaintiffs have the burden to show that using logit is reliable *in this context*. Plaintiffs cannot meet that burden where their own expert admits that a

1 basic feature of the logit demand model he used does not hold in the circumstances of this case.

2 **B. Dr. Singer's Formula Does Not Account for Focal Point Pricing.**

3 Dr. Singer's failure to account for focal point pricing also renders his pass-through model  
4 unreliable. Plaintiffs' own expert, Dr. Rysman, testified that "as a matter of economic principles,"  
5 "[i]f focal point pricing is important," then "some firms would not change price in response to a  
6 change in the commission rate." Ex. 3, Rysman Dep. at 62:16-23. Those economic principles  
7 apply here because, as Dr. Singer conceded, "focal point pricing is an important consideration."  
8 Ex. 7, Singer Dep. at 202:5-7. Plaintiffs protest in a footnote that Google "takes that exchange out  
9 of context," Opp. at 10 n.8, but tellingly they do not explain how. Dr. Singer's testimony is clear:

10 Q. I guess what I'm asking is, is it your opinion that focal point  
11 pricing doesn't explain any developers' pricing in the actual world?

12 A. No, I think that's too harsh. I think that focal point pricing is an  
important consideration here.

13 Ex. 7, Singer Dep. at 202:2-7. Where focal point pricing is important, courts in this District have  
14 excluded expert opinions in antitrust cases for failing to account for it in estimating pass-through.  
15 Mot. at 10–11 (citing *In re Apple iPhone Antitrust Litig.*, 2022 WL 1284104, at \*8 (N.D. Cal. Mar.  
16 29, 2022); *In re Lithium Ion Batteries Antitrust Litig.*, 2018 WL 1156797, at \*3-5 (N.D. Cal. Mar.  
17 5, 2018); *In re Optical Disk Drive Antitrust Litig.*, 303 F.R.D. 311, 324-25 (N.D. Cal. 2014)).

18 Plaintiffs fail to distinguish these cases. *First*, they argue "there is no 'overwhelming  
19 evidence'" that "'developers would choose to price their apps at focal points ending in 99 cents.'"  
20 Opp. at 10 (citation omitted). Wrong. It is undisputed that "from August 2016 to July 3, 2021,  
21 █% of U.S. consumers' app transactions were set such that the retail prices ended in '99.'" *See*  
22 MDL Dkt. No. 489-3 ("Ex. 2, Leonard Rep.") ¶ 32 n.7. *Second*, Plaintiffs claim Dr. Singer "has  
23 empirically" accounted for focal point pricing. Opp. at 10. Wrong again. Dr. Singer only  
24 analyzed prices "[u]sing 10-cent focal point intervals," *id.*, *i.e.*, prices that end in "9." That  
25 ignores the 97% of transactions at prices ending in "99." Ex. 2, Leonard Rep. ¶ 32 n.7. Because  
26 Dr. Singer has done nothing to account for that focal point pricing, his formula is unreliable.

27 **C. Dr. Singer's Formula Does Not Account for Developers' Costs.**

28 Dr. Singer's pass-through formula is also unreliable because it does not account for

1 developers' marginal costs other than service fees. Plaintiffs concede that Dr. Singer ignored  
 2 these marginal costs, noting that they "drop out of the equation" and that it would be "impossible"  
 3 to determine each developer's marginal costs. Opp. at 11 & n.9. Thus, the only question is  
 4 whether a reliable measure of pass-through must account for developers' marginal costs other than  
 5 Google's service fees. If the answer is yes, then Dr. Singer's formula is not reliable because he  
 6 has not measured these other marginal costs. Dr. Singer himself answered the question "Yes":

7           Q. Okay. And so one input into the generally accepted economic  
 8           model of how the profit-maximizing developer would set pri --prices  
               is the marginal costs other than the service fee.

9           A. For short-run profit maximization, the answer is, yes, that this  
 10          model, at this high level of ab -- of abstraction, is a function of the  
               marginal cost.

11 Ex. 7, Singer Dep. at 108:17-25. Dr. Singer's pass-through formula cannot ignore developers'  
 12 other marginal costs when he concedes that the extent of their pass-through depends on them.

13           Plaintiffs' response that this testimony "concerns a separate equation" from Dr. Singer's  
 14 pass-through formula, Opp. at 11, misses the point. Dr. Singer's reports include an economic  
 15 expression for how a profit-maximizing firm would set prices when a cost that is the percentage of  
 16 the price (an *ad valorem* cost) changes. MDL Dkt. No. 489-2 ("Ex. 1, Singer Rep.") ¶ 337. In  
 17 that expression, prices are proportional to developers' other marginal costs. Dr. Singer testified  
 18 that this relationship is "generally accepted in economics," and when asked whether it reflected  
 19 "the correct economic way to model the relationship between the developer's price and the  
 20 marginal cost in general," Dr. Singer agreed that this was "the [right] way to think about it." Ex.  
 21 7, Singer Dep. at 107:8-15. But Dr. Singer's pass-through formula ignores developers' other  
 22 marginal costs. As such, Dr. Singer has departed from what he concedes are standard economic  
 23 principles. Opinions based on his pass-through formula therefore must be excluded.

24           **D. Dr. Singer's Formula Does Not Account for Available Data.**

25           Finally, Dr. Singer's pass-through formula is unreliable because it guarantees pass-through  
 26 rather than attempting to measure it using actual data regarding whether pass-through happened.  
 27 Plaintiffs do not dispute that Dr. Singer did not use Google transactional data to conduct any  
 28 analysis of whether developers reduced their prices when Google reduced service fees. Nor do

1 Plaintiffs dispute that Dr. Singer’s formula will always predict pass-through because no app has  
 2 100% share of its category. The Court does not have to go further.

3 Plaintiffs’ suggestion that Google’s expert Dr. Leonard “has employed similar methods to  
 4 Dr. Singer’s work” is wrong. Opp. at 12. In the article Plaintiffs cite, Dr. Leonard did *not* assert  
 5 that it was proper to ignore data regarding actual pass-through as Dr. Singer does. Rather, Dr.  
 6 Leonard noted that one specific empirical study of pass-through implied a demand curve that was  
 7 unlikely to hold in the real world. Dr. Leonard’s point is directly applicable here: actual data on  
 8 pass-through shows that the logit demand curve that Dr. Singer has used does not capture reality.<sup>2</sup>

9 Plaintiffs argue that Dr. Singer showed “that developers pass through *ad valorem* taxes,”  
 10 which they say are “similar to” Google’s service fees. Opp. at 12. Not so. Dr. Singer’s  
 11 regression measures the relationship between sales taxes and after-tax prices and finds that when  
 12 sales taxes increase, prices including tax also increase, Ex. 1, Singer Rep. ¶¶ 367-368. That truism  
 13 says nothing about whether developers would have charged lower prices if Google reduced service  
 14 fees, particularly because developers cannot offer different prices in different states depending on  
 15 tax rates—which makes the analogy useless. Ex. 2, Leonard Rep. ¶¶ 81-82.

16 Plaintiffs also fail to distinguish *Sidibe v. Sutter Health*, 333 F.R.D. 463 (N.D. Cal. 2019).  
 17 In that case, the plaintiffs’ expert “assumed” that “the method by which health plans pass on their  
 18 costs through to their customers’ premiums” was “formulaic” and “then developed a ‘simple’  
 19 regression-analysis model to try to support that assumption.” *Id.* at 497. Similarly, here, Dr.  
 20 Singer assumed that demand for app transactions fit a logit form and then used a regression to test  
 21 that fit. In *Sibide*, the court found that the plaintiffs’ expert had “no methodology for taking  
 22 health-plan competition into account in her original regression-analysis model, undermining her  
 23 model’s reliability.” *Id.* Here, too, Dr. Singer has no methodology to account for the extent to  
 24 which apps in a given category in the Google Play store compete or are substitutes.

25 Plaintiffs should not be permitted to ask a jury to award damages based on their expert’s

26 \_\_\_\_\_  
 27 <sup>2</sup> Indeed, in the case discussed in the article, the court rejected testimony that “projected a pass  
 28 through rate” in favor of real-world data showing what pass-through had been “historically.” *FTC*  
*v. Staples, Inc.*, 970 F. Supp. 1066, 1090 (D.D.C. 1997).

promises that his model is “good enough.” Dr. Singer has ignored the data because they confirm his admitted failure to consider multiple, undisputedly important economic factors in pass-through. Those failures make his pass-through formula unreliable and inadmissible.

**II. DR. SINGER’S SUBSIDY MODELS ARE UNRELIABLE FOR PROVING INJURY OR DAMAGES.**

As a fallback, Plaintiffs put forward two types of injury damages models—each with multiple versions—premised on the theory that Google would have offered users more valuable Play Points subsidies. Plaintiffs’ opposition confirms that both of these models are inadmissible.

**A. Dr. Singer’s Subsidy Models Cannot Reliably Measure Individual Injury or Damages Because They Assume Users Would Have Signed Up for Play Points.**

As an initial matter, Consumer Plaintiffs cannot present Dr. Singer’s subsidy models at trial because the Court has not conducted a “rigorous analysis” of whether those models can reliably estimate injury for millions of individual consumers. *Olean Wholesale Grocery Coop., Inc. v. Bumble Bee Foods LLC*, 31 F.4th 651, 664 (9th Cir. 2022). Plaintiffs cite no case holding that a class of plaintiffs can present an injury model that a court has not found satisfies Rule 23.<sup>3</sup>

Regardless, as to all Plaintiffs, Dr. Singer’s subsidy models cannot reliably estimate injury or damages for any consumers because those models assume without any evidence that *all* users would have signed up for Play Points. Plaintiffs do not dispute that only a minority of Google Play store users sign up for Play Points. Nor do Plaintiffs dispute that a consumer who would not have signed up for Play Points without Google’s conduct did not suffer injury or damage. Thus, there is no dispute that in order to measure individual injury and damages reliably, Dr. Singer must have a model to determine whether a user would have signed up for Play Points.

Dr. Singer testified that he has no model that can tell the jury whether any consumer would have signed up for Play Points:

Q. If I were to come to you with a user chosen at random from the

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<sup>3</sup> *Krueger v. Wyeth, Inc.*, 310 F.R.D. 468 (S.D. Cal. 2015), on which Plaintiffs rely, Opp. at 13, is not to the contrary. In *Krueger*, a decision on certification issues, the Court *did* scrutinize whether the damages and injury models the class offered met Rule 23’s requirements. *Id.* at 482.

1 data that you've looked at of people that used the Google Play Store,  
 2 could your model tell me whether that user would have signed up  
 for the Google Play Points program in the but-for world?

3 A. I don't think the model tells you whether a user will sign [up]...

4 MDL Dkt. No. 489-4, Ex. 4, Singer Merits Dep. at 166:15-22. Dr. Singer testified that his  
 5 Amazon Coins model could not do this, either. *Id.* at 172:23-174:7. Plaintiffs do not address this  
 6 testimony at all. They simply try to change the subject, suggesting that the "relevant economic  
 7 question is the *total discounts* consumers would receive." Opp. at 15. That all but admits that the  
 8 subsidy models cannot estimate individual consumer injury.

9 Plaintiffs cite Dr. Singer's bare conclusion that it is a "safe inference" that "all or almost  
 10 all consumers" would have signed up for Play Points. Opp. at 14. But Plaintiffs' burden is to  
 11 *show* that this inference would be a safe one for the jury. Plaintiffs have not done so—and they  
 12 cannot do so because Dr. Singer admitted that he has not conducted any analysis of whether users  
 13 would have signed up for Play Points. Dr. Singer testified that he has not "calculated the  
 14 percentage credit on the price that would be necessary for any consumer to find it worth[while to]  
 15 overcome the cost of signing up and sign up for the Play Points program" and that he has not  
 16 conducted "any analysis of the elasticity of demand for the Play Points program." Ex. 4, Singer  
 17 Merits Dep. at 167:11-25, 168:19-169:15. Plaintiffs do not address this testimony.

18 Instead, Plaintiffs cite a document suggesting that many users signed up for Play Points in  
 19 Japan and another showing usage of the Amazon Coins program. Opp. at 13. But neither  
 20 document shows which users would have signed up for Play Points in the but-for world or whether  
 21 the subsidies that Dr. Singer says Google would have offered in the but-for world would have led  
 22 any more users to sign up for Play Points. Dr. Singer has no method to answer either of those  
 23 questions. Accordingly, his subsidy models cannot reliably measure individual injury or damages.  
 24 That makes the models inadmissible.

25 **B. Dr. Singer's Subsidy Models Are Unreliable for Additional Reasons.**

26 Dr. Singer's subsidy models are unreliable and inadmissible for additional reasons.

27 **Play Points.** Plaintiffs do not dispute that Dr. Singer's Play Points model assumes that  
 28 Google's market share in the but-for world would have been the same as AT&T's market share in



1 long-distance telephone service in the 1980s. (Dr. Singer’s pass-through model makes the same  
 2 assumption, Ex. 4, Singer Merits Dep. at 170:13-17 (“Q. Your Play Points model also uses the  
 3 elasticity of demand from an article about A&T long distance in the 1980s? A. That’s of the rival  
 4 elasticity, that’s right.”), which makes it unreliable for the same reasons.) Plaintiffs agree that  
 5 “what matters” when using a benchmark is “similarities in competitive dynamics,” Opp. at 14, but  
 6 they do not identify any similarities in the competitive dynamics of long-distance telephone  
 7 service in the 1980s and the but-for world of smartphone app stores. Plaintiffs claim AT&T was  
 8 “a platform monopolist, benefitting from network effects, that leveraged monopoly power,” Opp.  
 9 at 14, but as Plaintiffs concede, those are assertions about AT&T “*before* being forced to open the  
 10 market to competition,” *id.* (emphasis added), not about the competitive market Dr. Singer chose  
 11 as a benchmark for the but-for world. Plaintiffs identify no parallels between 1980s long-distance  
 12 telephone service and competitive markets involving transactions with apps on smartphones in the  
 13 2010s that could justify using the former as a benchmark for the latter. And Plaintiffs do not  
 14 respond to Google’s point that Dr. Singer cannot use 1980s landline phone service as a benchmark  
 15 when he considers even 1990s flip phones “economically irrelevant.” Mot. at 14.

16 **Amazon Coins.** Dr. Singer’s Amazon Coins model is premised on an assumption that  
 17 Google would have offered subsidies equal, as a percentage of its revenue, to those Amazon  
 18 offered in its Amazon Coins program on the Amazon Appstore. Plaintiffs fail to show that this  
 19 benchmark is reliable. Dr. Singer’s entire pass-through model is based on the logic that a firm’s  
 20 market share affects its price, but Plaintiffs do not even address why Google would have offered  
 21 the same user discounts as a competitor with a market share 30 times smaller. *Compare* Mot. at  
 22 15. Plaintiffs argue that Dr. Singer was right to ignore other potential benchmarks listed in Table  
 23 7 of his own report because they are not Android app stores, but the report calls these “comparable  
 24 competitive digital platform environments.” Ex. 1, Singer Rep. ¶ 318. A benchmark that ignores  
 25 potentially “comparable” products is not reliable. *In re Apple iPhone Antitrust Litig.*, 2022 WL  
 26 1284104, at \*3-4 (excluding expert opinion for “cherry-pick[ing]” benchmarks).

## 27 CONCLUSION

28 Dr. Singer’s opinions based on his injury and damages models should be excluded.



1 Respectfully submitted,

2  
3 Dated: June 8, 2023

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/s/ Justin P. Raphael

Justin P. Raphael

# **Exhibit H1**

## **Public Redacted Version**

**EXHIBIT 2**  
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NORTHERN DISTRICT OF CALIFORNIA  
SAN FRANCISCO DIVISION**

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*Plaintiffs,*

v.

GOOGLE LLC, GOOGLE IRELAND LIMITED,  
GOOGLE COMMERCE LIMITED, GOOGLE  
ASIA PACIFIC PTE. LIMITED, GOOGLE  
PAYMENT CORP., and ALPHABET INC.,

*Defendants.*

**Expert Report of Dr. Marc Rysman**

**October 3, 2022**

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## I. Introduction

### A. Qualifications

1. My name is Marc Rysman. I am a Professor of Economics, and Chair of the Department of Economics, at Boston University, where I teach undergraduate and graduate courses in industrial organization, econometrics, antitrust, and regulation. I specialize in industrial organization and applied econometrics, and my research focuses on industrial organization and competition, and the related issues of antitrust and regulation. In particular, I focus on the issues of network effects, platform markets, two-sided markets, standardization, and compatibility. I have studied a variety of industries, such as financial markets, telecommunications, payment cards, consumer electronics, and Yellow Pages directories. My research is primarily empirical but includes theoretical work as well.

2. I have been a visiting scholar at the Federal Reserve Banks of Boston and of Minneapolis, as well as at Harvard University, the Massachusetts Institute of Technology, and the Center for Studies in Industrial Organization at Northwestern University. Since 2020, I have been on the Scientific Committee for an Online Seminar on the Economics of Platforms at Toulouse School of Economics in Toulouse, France. On invitation, I have taught several short courses in economics related to two-sided markets, network effects, demand estimation, and econometrics, including at Shanghai University of Finance and Economics, Fordham Competition Law Institute Training for Agency Economists, and Hitotsubashi University. I have been an invited lecturer on network effects, platforms, and digital industries at Toulouse School of Economics, the Federal Reserve Bank, and the European Association for Research in Industrial Economics among others, and at various conferences on platforms and payment networks.

3. I am the author or co-author of more than 35 published articles, many of which have been published in leading peer-reviewed journals, including the *American Economic Review*, *RAND Journal of Economics*, *Review of Network Economics*, the *Journal of Applied Econometrics*, and the *Journal of Political Economy*, among others. I have also held editorial positions at leading economic journals, including *RAND Journal of Economics*, *Journal of Industrial Economics*, *Review of Network Economics*, and *International Journal of Industrial Organization*, and I am a former President and current member of the Board of Directors of the Industrial Organization

Society. I have received several grants from the National Science Foundation, including grants to study network effects, and from the Networks, Electronic Commerce and Telecommunications (NET) Institute. I have received several awards, including the Christensen Award in Empirical Economics, the Neu Family Award for Teaching Excellence (2006 and 2012), the Gerald M. Gitner Award for Excellence in Undergraduate Teaching in Economics (2000), Graduate Advisor of the Year in Economics (2022), and Professor of the Year for Boston University in 2007 (as chosen by BU's Greek societies). I received my Ph.D. in Economics from the University of Wisconsin-Madison in 1999 and my B.A. in Economics from Columbia University in 1992.

4. I have served as an expert witness in various legal proceedings, including antitrust matters involving payment cards and the high-tech sector. I have also served as a consultant to businesses and regulatory agencies, including the Federal Communications Commission and the Federal Reserve Bank. In 2012, I was commissioned to write a paper on interchange fee policy and its effect on competition in the payments card market, entitled "Payment Networks," which I presented to then-Chairman Ben Bernanke, then-Vice Chairman Janet Yellen, and the other members of the Board of Governors of the Federal Reserve Bank at an "Academic Consultant's Conference for the members of the Board of Governors."

5. A copy of my curriculum vitae, which describes my education, teaching experience, publications, and testifying experience, is attached as Appendix A.

## **B. Assignment**

6. I have been retained as an independent expert in antitrust economics by the Attorneys General for 39 states, commonwealths, and districts of the United States (hereafter referred to simply as the "States")<sup>1</sup> (a) to evaluate the competitive effects of certain alleged conduct

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<sup>1</sup> The states, commonwealths, and districts include Utah, New York, North Carolina, Tennessee, Arizona, Colorado, Iowa, Nebraska, Alaska, Arkansas, California, Connecticut, Delaware, District of Columbia, Florida, Idaho, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Oklahoma, Oregon, Rhode Island, South Dakota, Texas, Vermont, Virginia, Washington, and West Virginia.

by Google in relation to the Google Play Store and Google Play Billing and (b) to quantify damages, if any, to consumers in the States and nationwide resulting from this challenged conduct.

### **C. Materials Considered**

7. To evaluate the competitive effects of Google's challenged conduct and form my opinions, I have reviewed a series of materials, both publicly available and those produced in this litigation. These include Google documents, deposition testimony and associated exhibits collected in this matter<sup>2</sup>, academic literature, regulatory reports and decisions in the U.S. and other

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<sup>2</sup> Deposition of Christian Cramer, Finance Director for Play at Google, January 13-14, 2022 (hereafter "Cramer (Google) Deposition"); Deposition of David Kleidermacher, Vice President, Engineering, at Google, February 3-4, 2022 (hereafter "Kleidermacher (Google) Deposition"); Deposition of James Kolotouros, Vice President, Android Platform Partnerships at Google, February 2-3, 2022 (hereafter "Kolotouros (Google) Deposition"); Deposition of Jamie Rosenberg, Vice President of Strategy and Operations, Platforms and Ecosystems Division, at Google, February 10, 2022 (hereafter "Rosenberg (Google) Deposition"); Deposition of Michael Marchak, Director of Play Partnerships, Strategy and Operations, at Google, January 12-13, 2022 (hereafter "Marchak (Google) Deposition"); Deposition of Paul Feng, Product Management Director at Google, January 14 and 18, 2022 (hereafter "Feng (Google) Deposition"); Deposition of Sameer Samat, Vice President of Product Management at Google, February 2-3, 2022 (hereafter "Samat (Google) Deposition"); Deposition of Tian Lim, Vice President, Engineering, Product and UX, at Google, December 2, 2021 (hereafter "Lim (Google) Deposition"); Deposition of Ruth Porat, Chief Financial Officer at Google, September 15, 2022 (hereafter "Porat (Google) Deposition"); Deposition of Paul Perryman, Vice President of Business Development and Partnerships at Netflix, September 28, 2022 (hereafter "Perryman (Netflix) Deposition"); Deposition of Eric Chu, Engineering Director at Meta Platforms and formerly Director of the Android Developer Ecosystem at Google, December 20, 2021, and January 14, 2022 (hereafter "Chu (Meta Platforms (formerly Google)) Deposition"); Deposition of Lawrence Koh, General Manager of FIFA Mobile at EA and formerly Director and Global Head of Games Business Development at Google, December 9, 2021 (hereafter "Koh (EA (formerly Google)) Deposition"); Deposition of Haseeb Malik, Director of Mobile Publishing at Epic Games, March 4, 2022 (hereafter "Malik (Epic Games) Deposition"); Deposition of Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, April 21, 2022 (hereafter "Brady (Google) Deposition"); Deposition of Richard Czeslawski, Developer Class Representative and Chief Operating Officer and President of Pure Sweat Basketball, March 21, 2022 (hereafter "Czeslawski (Pure Sweat Basketball) Deposition"); Deposition of Lacey Ellis, Developer Class Representative and Founder and CEO of LittleHoots LLC, March 22, 2022 (hereafter "Ellis (LittleHoots) Deposition"); Deposition of Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, August 15-16, 2022 (hereafter "Lockheimer (Google) Deposition"); Deposition of Andrew Rubin, Co-founder of Android and formerly Senior Vice President, Mobile and Digital Content, at Google, May 17-18, 2022 (hereafter "Rubin (formerly Google) Deposition"); Deposition of Daniel Vogel, Chief Operating Officer at Epic Games, May 23, 2022, (hereafter "Vogel (Epic Games) Deposition"); Deposition of Jonathan Gold, Finance Manager for Android at Google, June 23-24, 2022 (hereafter "Gold (Google) Deposition"); Deposition of Kirsten Rasanen, formerly Business Development Director at Google, August 17, 2022 (hereafter "Rasanen (formerly Google) Deposition"); Deposition of Christopher Li, Director and Head of Product Growth at Google, May 24-25, 2022 (hereafter "Li (Google) Deposition"); Deposition of Mrinalini Loew, Product Lead for Google Play Commerce at Google, September 15, 2022 (hereafter "Loew (Google) Deposition"); Deposition of

jurisdictions, trade press, and structured data, including Google’s proprietary data and third-party data from IDC, data.ai (formerly App Annie), Statcounter, and Statista, among others. Finally, I understand that my support team has had access to all materials produced in this matter via the Consumers’ and States’ document management database. A list of materials that I relied upon in forming my expert opinions described herein is attached as Appendix B.

8. The work presented in this report has been conducted by me and staff working under my direction at AlixPartners, a global consulting firm. I am compensated at a rate of \$700 per hour for my work in this matter, and I receive additional compensation related to billings by staff at AlixPartners who assisted on this report at my direction and who continue to support my work in this matter. My compensation is not dependent on the outcome of this matter. My work is ongoing, and I will continue to review the discovery record to understand the evidence in this case. I reserve the right to supplement and to amend my opinions.<sup>3</sup>

## **II. Summary of Opinions**

9. Based on my analyses summarized in this report, my review of the record evidence, and my experience as an industrial organization economist, I find that Google holds market power in two relevant antitrust markets, each of which is pertinent to evaluating the effects of Google’s challenged conduct. The first is the market for the distribution of Android apps on Android smart mobile devices worldwide (excluding China) (“Android App Distribution Market”). The Android App Distribution Market includes the Google Play Store, the online app store through which Google

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Edward Cunningham, Product Manager for Android at Google, July 21-22, 2022 (hereafter Cunningham (Google) Deposition”); Deposition of Nick Sears, Android Co-founder at Google, July 1, 2022 (hereafter “Sears (Google) Deposition”); Deposition of Jamie Rosenberg, Vice President of Strategy and Operations, Platforms and Ecosystems Division, at Google, July 14, 2020 (hereafter “Rosenberg (Google) Deposition 2020”); Deposition of Christopher Dury, CEO at GetJar, September 16, 2022 (hereafter “Dury (GetJar) Deposition”); Deposition of Sandra Alzetta, Vice President of Payments at Spotify, September 29, 2022 (hereafter “Alzetta (Spotify) Deposition”); Deposition of George Christopoulos, Founder at SlideMe, September 9, 2022 (hereafter “Christopoulos (SlideMe) Deposition”); Deposition of Donn Morrill, Director of Developer Relations for Entertainment Devices and Services at Amazon, August 11, 2022 (hereafter “Morrill (Amazon) Deposition”); and Deposition of Sebastian Porst, Security Engineering Manager at Google, July 13-14, 2022 (hereafter “Porst (Google) Deposition”).

<sup>3</sup> For example, I understand that Google recently produced transaction data through May 2022. Due to the size of the production and due to the technical issues that have arisen in processing the data, I reserve my rights to update my analyses (including charts and appendices) to reflect the newly produced data.

distributes mobile apps for the Android operating system; original equipment manufacturers (“OEMs”) Android app stores (*e.g.*, the Samsung Galaxy Store); other third-party Android app stores (*e.g.*, the Amazon Appstore and F-Droid); and sideloading (*i.e.*, downloading an app onto a smart mobile device directly from a developer’s website). Those distribution channels could be competitively viable alternatives to the Google Play Store in the absence of Google’s challenged conduct. I focus my report on smart mobile devices, which includes smartphones and tablets (devices that allow users to download, install, and run applications), but excludes e-readers, feature phones, and basic phones (which have more basic functionality).

10. The second relevant market for evaluating the competitive effects of Google’s challenged conduct is the market for in-app billing services for purchases of digital in-app content through apps on Android smart mobile devices worldwide (excluding China) (“the Android In-App Billing Services Market”). There is a bundle of services associated with in-app digital content purchases, including payment processing, for which developers could reasonably use a variety of alternative independent service providers or self-serve. Developers who monetize in-app content require a billing service provider to receive payment and unlock the purchased in-app content, among other services. The billing service provider is a vendor to the developer, who requires In-App Billing Services to sell digital in-app content to Android smart mobile device users as part of the user experience the app provides. Thus, I find that the Android In-App Billing Services Market includes (i) Google Play Billing, (ii) ) billing service systems provided by other Android app stores; (iii) developers’ own billing service systems; and (iv) independent billing service providers.

11. Further, to identify the boundaries of the relevant markets, I perform a SSNIP analysis, which confirms that a small increase from a competitive commission and a small decrease from competitive direct discounts to consumers would be profitable for a hypothetical monopolist of Android App Distribution and In-App Billing Services. For my SSNIP analysis, I first ask whether Android App Distribution and Android In-App Billing Services Markets are defined too narrowly. I consider whether other possible alternatives, such as the Apple App Store, act as sufficient constraints on a hypothetical monopolist that they should be considered part of the relevant market. Therefore, I ask whether a hypothetical monopolist of both markets would find it profitable to impose a combined 10% SSNIP across Android App Distribution and Android In-App

Billing Services. To be clear, this does not mean that Android App Distribution and Android In-App Billing Services necessarily are in one broad single market. As stated in the *U.S. Merger Guidelines* jointly published by the U.S. Department of Justice and the Federal Trade Commission: “The hypothetical monopolist test ensures that markets are not defined too narrowly, but it does not lead to a single relevant market.”<sup>4</sup> I find the 10% combined SSNIP on the Android App Distribution and In-App Billing Services Markets would be profitable and thus the combined market is not subject to any significant competitive constraints (such as the Apple App Store and associated billing services). I further demonstrate that Android App Distribution and In-App Billing Services are separate and distinct product markets. The products in these two relevant markets are complements (consumers and developers cannot have in-app content without distribution of the app), and they are two separate products with separate demand.

12. Based on a number of factors, I conclude the geographic market for both product markets is worldwide, excluding China. OEMs of Android smart mobile devices sign Mobile Application Distribution Agreements (“MADAs”), under which Google allows them to sell Android smart mobile devices with the Google Play Store pre-installed (and to license Google Mobile Services (“GMS”)) in most parts of the world. Android developers can therefore reach a global audience regardless of their location. As developers want to reach as many users as possible, their incentive is to make their apps available globally. Many In-App Billing Service providers offer their services worldwide, or could do so absent Google’s restraints. Android developers require In-App Billing Services to sell digital in-app content to customers worldwide (ex. China). Finally, the Google Play Store and Google Play Billing are unavailable in China.

13. I find that Google has market power in each of these markets. In each market, Google’s market share exceeds 85% and is protected by significant barriers to entry, such as the installed base of the Android operating system (and its attendant indirect network effects) and contractual restrictions that thwart successful entry/expansion by would-be potential rivals. Google

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<sup>4</sup> U.S. Department of Justice and the Federal Trade Commission, “Horizontal Merger Guidelines,” August 19, 2010, available at <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010>, (hereafter, “*U.S. Merger Guidelines*”), p. 9.

also successfully imposes a supracompetitive commission and earns supracompetitive margins, which also show its market power.

14. I find that Google has monopolized each of these markets and impeded viable competition through various anticompetitive means. In the market for Android App Distribution, Google's conduct restricts rival Android app stores from entry and expansion in the three key distribution channels by which app stores can reach Android users: the Google Play Store, preloading, and sideloading. Google has signed restrictive contracts to share monopoly rents with mobile network operators ("MNOs") and OEMs, sharing their monopoly rents with them, to prevent the pre-installation of MNO, OEM, and third-party app stores and to promote the Google Play Store over these alternatives. Google requires in the challenged agreements with OEMs that the Google Play Store receive better or equal treatment to any other Android app store on applicable Android smart mobile devices, which creates barriers to rivals to obtain such placement or discovery from users. To further restrict competition from rival Android app stores and inhibit their installation on Android smart mobile devices, Google increased user friction by erecting a series of technological barriers to make sideloading appear less attractive, such as a cumbersome series of prompts and warning screens when users attempt to install an alternative app store on their Android smart mobile devices. By erecting roadblocks to each alternative method of Android App Distribution, Google prevents meaningful competition over the distribution of other Android app stores through the Google Play Store by foreclosing channels through which competitors could reach end-consumers, the Android users.

15. Google also paid developers in exchange for not launching their titles or features exclusively on other app stores. Google sought to cut off rival app stores' exclusive access to apps from high-value developers by offering incentive payments to developers. In turn, this reduced rivals' access to high-value consumers. Importantly, due to indirect network effects, if a rival is unable to compete for a share of developers, the rival will attract fewer consumers, and vice-versa. Indirect network effects thus magnify the impact of reduced competition on one side of a two-sided market with a corresponding effect on the other.



16. Through this combined course of conduct, Google has restricted competition by imposing barriers in each Android app distribution channel and maintained market power in the market for Android App Distribution.

17. In the market for Android In-App Billing Services, Google has tied its Google Play Billing to app distribution through the Google Play Store, thus leveraging its market power in Android App Distribution into an adjacent market. Google’s behavior satisfies the standard conditions for tying. Android In-App Billing Services, and particularly payment services, is a separate product for which there is both separate supply (rival firms willing to supply payment services for the purchases of in-app digital content) and separate demand (app developers that would like to use alternative Android In-App Billing Service providers (or their own services) but cannot because of the contract imposed by Google). There is no technological benefit to making the combination of these separate products mandatory – indeed, some developers report worse consumer experience using Google Play Billing and worse fraud detection. Google’s own divisions, such as YouTube subscription services, refused to use Google Play Billing because it was inferior to its own service. Google has market power in the tying good (Android App Distribution) and a substantial share of the market for the tied good (Android In-App Billing Services) is foreclosed by this tie.

18. Furthermore, the tie has anticompetitive consequences. Competing Android In-App Billing Service providers may offer forms of payment that Google Play Billing does not, exposing developers to new monetization opportunities with new consumers using different forms of payment. By restricting developers’ ability to monetize, Google shrinks its own Android ecosystem, and fewer developers enter to launch apps. Google itself recognizes a “laddering up” effect in which developers that use rival payment services could then move to demand competition in other in-app billing services, and ultimately in app distribution.<sup>5</sup>

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<sup>5</sup> GOOG-PLAY-006829073.R-172.R, at 157.R and 170.R-171.R (Google presentation describing a potential competitive dynamic as a process of “laddering up,” i.e., allowing developers to use competing payment solutions (e.g.,



19. I find that Google’s monopolization of these markets through various anticompetitive means allowed Google to impose a substantial overcharge and caused harm to consumers —through higher net prices and lower variety and app availability. Whereas Google charges a 30% commission on most app distribution and in-app content purchases, it readily offered lower commissions when faced with even modest competitive pressure, often 15% or even lower. Based on an analysis of these benchmark commissions, I find that competition in the Android App Distribution and Android In-App Billing Services Markets would have led to total commission rates of 15% or lower.

20. To estimate damages to consumers derived from Google’s anticompetitive conduct, I develop an economic model of Android app distribution and in-app billing services from existing economic literature. My model captures the fact that consumers care not just about the prices of apps and in-app content but also the variety of apps and in-app content available through the app store. In my model, app developers make profit-maximizing choices about prices and entry. The higher developers’ potential margins, the more developers will enter, and the more choices and varieties of apps consumers will have. Higher Android app store commission rates and lower consumer discounts increase net prices to consumers, reduce profits to app developers, increase app exit, and block new app entry, which reduces the app variety available to consumers.

21. I calibrate the model based on Google Play Store transaction data provided by Google to recover suitable parameters and formulae for SSNIP and damages quantifications. For consumer demand elasticity, my regression results are generally consistent with the consumer

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from Facebook, Amazon, or Stripe) and thereby enabling those companies to offer distribution and discoverability in addition to just payment solutions); *See also* Marchak (Google) Deposition, pp. 4731-4759 (“And you understand the concept of laddering up was that Google was concerned that if it allowed developers to use competing payment solutions from somebody like Facebook or Amazon or Stripe, those companies may begin to offer discoverability and distribution in addition to just payment solutions; correct? ... THE WITNESS: I believe that was a concern that was brought up in this slide. I wouldn't say Google had that concern, but it was brought up in the slide... Q Do you see that Google identified Amazon, Facebook, Samsung, Stripe and Epic as potential suppliers of alternative payment solutions that could disrupt and grow into distribution alternatives; correct? .... THE WITNESS: I see that five companies are highlighted here. Q You understand that by ‘disrupt,’ that means that in addition to providing just payment solutions, the presenter was identifying those as companies that would potentially would grow into distribution as well; correct?. THE WITNESS: I think the presenter was saying that these companies have aspirations or capabilities to expand. I think that's what they are highlighting.”).

demand elasticity calculated for the Google Play Store from the academic literature. For this parameter, I rely on the elasticity from the economic literature because it leads to a more conservative calculation of damages.

22. I use the model to estimate damages to consumers due to the high commission and low direct discounts to consumers that Google imposed through the Google Play Store as a result of its anticompetitive arrangements. My damages calculations accounts for the effects of Google's high commissions and low discounts on the prices that consumers pay and the variety of apps and in-app content from which they may select. I provide several measures of damages that variously hold entry constant, hold prices constant, or allow for a total effect on consumer welfare in response to Google's high commissions and low discounts. While the total welfare effect accounts for all the economic effects of the high commissions and low discounts, to be conservative I take the minimum of the total welfare damages and variety damages, where, in the latter, I hold the price constant. In other words, in my variety damages, I assume that app and in-app prices do not change at all in response to a reduction in Google's commission and that developers keep 100% of the commission reduction that would obtain in the but-for world. With that assumption, I find variety damages in the Android App Distribution and Android In-App Billing Services Markets of roughly [REDACTED] for the period August 16, 2016, to June 5, 2023 ("the damages period").<sup>6</sup> I can also use the model to calculate the variety effect damages associated with Google Play Billing only, which I find to be approximately [REDACTED].

23. Overall, I find compelling evidence that Google has monopolized the markets for Android App Distribution and Android In-App Billing Services through a variety of anticompetitive acts. Despite employing a number of conservative assumptions, I find that Google has market power in two relevant markets, generated significant harm to competition, and substantially harmed consumers.

24. The remainder of this report details the analyses underlying my opinions. In Section III, I provide background information relevant to evaluating the challenged conduct in this matter,

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<sup>6</sup> I have been instructed by counsel to use these date ranges for my calculations.

which guided my analysis. Section IV describes the Google business entities operating in the markets at issue, the relevant Google contractual agreements, as well as details of its challenged conduct. In Sections V and VI, I present my analysis of market definition for the two relevant markets and summarize evidence of Google’s market power in these markets. In Sections VII and VIII, I present evidence that Google’s challenged conduct has harmed competition in the Android App Distribution and Android In-App Billing Markets through increased prices, lowered output, and reduced innovation. In Section IX, I summarize my damages model and present my estimate of damages to consumers. Section X concludes.

### **III. Mobile Ecosystems and the Digital Economy**

25. To assess whether and to what extent Google has monopolized Android App Distribution and Android In-App Billing Services, I start by describing the economic elements of mobile ecosystems: the relevant technologies, including mobile devices, mobile operating systems, and mobile applications (“apps”); the development of mobile applications and the role of app developers; the means by which developers can distribute apps to consumers; and the function of billing services for in-app purchases of digital content.

#### **A. Mobile Technology**

##### *1. Mobile Devices, OEMs, and MNOs*

26. Mobile devices are handheld, portable computing devices that provide mobile (cellular or wireless) network access.<sup>7</sup> Mobile devices support various functions, such as communicating through voice calls and text messages, taking photographs or videos, browsing the internet with cellular or wireless networks, sharing mobile applications, and streaming music and

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<sup>7</sup> National Institute of Standards and Technology, “Mobile Device,” available at [csrc.nist.gov/glossary/term/mobile\\_device](https://csrc.nist.gov/glossary/term/mobile_device).

videos.<sup>8</sup> Mobile devices include, for example, smartphones, tablets, and e-readers, as well as basic phones and “feature phones” which generally offer a few services such as voice calling, text messaging, and limited web browsing.<sup>9</sup>

27. Smartphones are cell phones that run on a mobile operating system (“OS”) with advanced features, such as a high-resolution touch screen that displays an interactive user interface, a built-in camera for taking photos and videos, global positioning system (“GPS”) functionality, and the ability to download and run sophisticated applications.<sup>10</sup> Smartphones generally have more processing power and storage space, as well as greater connectivity options, than basic or feature

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<sup>8</sup> National Institute of Standards and Technology, “Mobile Device,” available at [csrc.nist.gov/glossary/term/mobile\\_device](https://csrc.nist.gov/glossary/term/mobile_device); IBM, “What is mobile technology?” available at <https://www.ibm.com/topics/mobile-technology>; and Verizon, “Top 10 Things to Do with Your New Smartphone,” available at <https://www.verizon.com/support/top-ten-things-to-do-with-your-smartphone/> and Google, “Send and receive text messages (SMS & MMS),” available at <https://support.google.com/fi/answer/6205096?hl=en&co=GENIE.Platform%3DAndroid>.

<sup>9</sup> National Institute of Standards and Technology, “Mobile Device,” available at [csrc.nist.gov/glossary/term/mobile\\_device](https://csrc.nist.gov/glossary/term/mobile_device). E-readers (e.g., the Amazon Kindle or Kobo Libra) are designed for reading digital books and magazines. Basic phones (e.g., the Alcatel One Touch or Samsung Gusto 3) are standard cell phones with two basic functions: voice calls and text messages. Feature phones (e.g., the Nokia 8000 or TTFone Titan) have some multimedia and internet capabilities in addition to voice calling and text message functions. They typically have a simple graphical user interface with non-touch displays and do not support additional applications. *See, e.g.*, Giordano, Medea, “The Best Ebook Readers,” WIRED, August 7, 2022, <https://www.wired.com/gallery/best-e-readers/>, DeviceAtlas, “Feature Phones in the USA,” available at <https://deviceatlas.com/blog/feature-phones-statistics-usa>, LaMarco, Nicole, “The 5 Best Basic Cell Phones of 2022,” Lifewire, February 9, 2022, available at <https://www.lifewire.com/basic-cell-phones-577534>; McCrocklin, Shannon, “Basic Phones, Feature Phones, and Smartphones for Research in Emerging Markets,” GeoPoll, July 30, 2019, available at [https://www.geopoll.com/blog/basic-phones-feature-phones-and-smartphones-for-research-in-emerging-markets/#Feature\\_Phones\\_for\\_Market\\_Research\\_in\\_Emerging\\_Markets](https://www.geopoll.com/blog/basic-phones-feature-phones-and-smartphones-for-research-in-emerging-markets/#Feature_Phones_for_Market_Research_in_Emerging_Markets); Techopedia, “E-book Reader,” 2021, available at [techopedia.com/definition/25200/e-book-reader](https://techopedia.com/definition/25200/e-book-reader); Techopedia, “Feature Phone,” February 5, 2016, available at [techopedia.com/definition/26221/feature-phone](https://techopedia.com/definition/26221/feature-phone); and PCMag, “Definition of feature phone,” available at <https://www.pcmag.com/encyclopedia/term/feature-phone#:~:text=A%20cellphone%20that%20contains%20a,as%20extensive%20as%20a%20smartphone> (“feature phone[:]: A cellphone that contains a fixed set of functions beyond voice calling and text messaging but is not as extensive as a smartphone. For example, feature phones may offer Web browsing and email, but they generally cannot download apps from an online marketplace”).

<sup>10</sup> Encyclopedia Britannica, “smartphone,” August 12, 2022, available at <https://www.britannica.com/technology/smartphone>; and Gutierrez, Anthony, Ronald G. Dreslinski, Thomas F. Wenisch, Trevor Mudge, Ali Saidi, Chris Emmons, and Nigel Paver, “Full-System Analysis and Characterization of Interactive Smartphone Applications,” IEEE Int. Symp. on workload Characterization, November 6-8, 2011, pp. 81-90, available at <http://tnm.engin.umich.edu/wp-content/uploads/sites/353/2017/12/2011.10.Full-System-Analysis-and-Characterization-of-Interactive-Smartphone-Applications.pdf>, at p. 1.

phones. Smartphones are also “equipped with innovative sensors” to display screens in portrait and landscape mode, and support motion-based navigation.<sup>11</sup>

28. Similar to smartphones, tablets (*e.g.*, the Apple iPad, Samsung Galaxy Tab, or Lenovo Tab) are touchscreen mobile devices that have Wi-Fi and cellular connectivity and the ability to accept sophisticated applications, and are primarily used for web browsing, games, or streaming music or videos, but are larger in size than smartphones.<sup>12</sup> Tablets differ from laptops; for example, tablets tend to be “[s]maller and lighter” (and thus more portable) and “[d]esigned for media consumption,” whereas laptops tend to be “[m]ore powerful,” “typically have more features,” and are “[d]esigned for productivity.”<sup>13</sup>

29. For the remainder of this report, I use the term “smart mobile devices” to mean smartphones and tablets, because a defining feature of smartphones and tablets is that they are general computing devices that let users to download, install, and run applications, while non-smart

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<sup>11</sup> Techopedia, “Smartphone,” February 25, 2019, available at [techopedia.com/definition/2977/smartphone](https://techopedia.com/definition/2977/smartphone).

<sup>12</sup> Google, “Understanding Tablet Users,” November 2016, GOOG-PLAY-000092281.R-330.R at 299.R (“About 90% of tablet users use their devices for one of 4 primary use cases: watching videos, playing games, doing work, or reading books. Most users say these activities account for most of their time on their tablet;” “Tablets are primarily used for videos, games. Single-use tablets are most often used for videos or games”); Lifewire, December 6, 2021, available at <https://lifewire.com/tablets-vs-laptops-832333>; PCMag, “Tablet,” available at <https://www.pcmag.com/encyclopedia/term/tablet>; Verizon, “What’s the Difference Between Wi-Fi Data and Cellular Data,” May 6, 2021, available at <https://www.verizon.com/articles/verizon-unlimited-plans/whats-the-difference-between-wifi-data-and-cellular-data/>; Walker-Todd, Alex, “Best tablet 2022: the top tablets you can buy right now,” *TechRadar*, September 14, 2022, available at <https://www.techradar.com/news/best-tablet>; and Geralt, Andrei, “Tablets vs smartphones: Which one is more enterprise worthy?” *Hexnode*, July 8, 2021, available at <https://www.hexnode.com/blogs/tablets-vs-smartphones-which-one-is-more-enterprise-worthy/>.

<sup>13</sup> Kyrnin, Mark, “Should You Buy a Tablet or a Laptop? A comparison of smart tablets and laptop computers,” *Lifewire*, April 12, 2021, available at <https://lifewire.com/tablets-vs-laptops-832333>. So-called “2-in-1” computers (*e.g.*, the Microsoft Surface) offer features of both tablets and laptops, such as detachable keyboards and higher processing power. *See, e.g.*, Microsoft, “Surface Pro 8,” available at <https://www.microsoft.com/en-gb/d/surface-pro-8/8qwertyq8v8xg?activetab=pivot%3aoverviewtab>; Wired, “Here Come the Hybrid ‘Laplets.’ Should You Care?” October 17, 2012, available at <https://www.wired.com/2012/10/windows8-laplet-hybrid/>; and Motorola Mobility, “March 10th WW Comms: Android Central Chooses Flex 5 Chromebook, Digital Trends Makes Tab M8 Best tablet, plus more on IdeaCentre Mini, ThinkPad X12 Detachable,” March 10, 2021, MOTO-NDCAL-00154735-738, at 736.

mobile devices are not general purpose and do not support user-installed applications through an online app distribution platform.<sup>14</sup>

30. Since the introduction of Blackberry phones in the early 2000s and the Apple iPhone in 2007, smartphones have become ubiquitous in the United States and worldwide.<sup>15</sup> In 2021, U.S. smartphone sales were expected to surpass \$70 billion, compared to under \$9 billion in 2007<sup>16</sup>, and, by 2021, 85% of Americans owned a smartphone, up from just 35% in 2011.<sup>17</sup> The number of smartphone users worldwide surpassed 6.2 billion in 2021 (approximately 78% of the worldwide population) and is projected to reach 7 billion in 2024.<sup>18</sup> Tablet ownership among U.S. consumers has also increased significantly from 8% in 2011 to 53% in 2021.<sup>19</sup>

31. Companies that design or manufacture smartphones and tablets are referred to as original equipment manufacturers or OEMs. Apple, Samsung, LG, and Lenovo/Motorola are among

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<sup>14</sup> See Techopedia, “Feature Phone,” February 5, 2016, available at [techopedia.com/definition/26221/feature-phone](https://techopedia.com/definition/26221/feature-phone). Although some feature phones have pre-installed essential apps, such as WhatsApp, Facebook, and Google Maps for basic functionalities, users cannot download or install other sophisticated apps with interactive features on these devices. *See, e.g.*, Nokia “Feature Phone – Nokia 8000 4G,” available at [https://www.nokia.com/phones/en\\_gb/nokia-8000-4g?sku=16LIOW01A05](https://www.nokia.com/phones/en_gb/nokia-8000-4g?sku=16LIOW01A05). *See* Section V.C.4 for additional information on the differences between feature phones and smartphones. In addition, Google’s aggregated data on app revenues shows that for apps and in-app purchases, the share of consumer spend on tablets over the total consumer spend on all smart mobile devices was between 9.3% and 13.9% in the U.S. during 2017-2021. This indicates consumers consider tablets as complements to smartphones for downloading apps and using apps. *See* Rysman Workpapers.

<sup>15</sup> *See, e.g.*, Davies, Hannah, “RIP BlackBerry: A timeline of every great BlackBerry phone we reviewed,” *Trusted Reviews*, January 7, 2022, available at <https://www.trustedreviews.com/opinion/rip-blackberry-a-timeline-of-every-great-blackberry-phone-we-reviewed-4194746>; and Montgomery, April, and Ken Mingis, “The evolution of Apple’s iPhone,” *Computerworld*, September 23, 2021, available at <https://www.computerworld.com/article/2604020/the-evolution-of-apples-iphone.html>.

<sup>16</sup> *See, e.g.*, Statista, “Smartphone sales forecasts in the United States from 2005 to 2022,” August 11, 2022, available at <https://www.statista.com/statistics/191985/sales-of-smartphones-in-the-us-since-2005>.

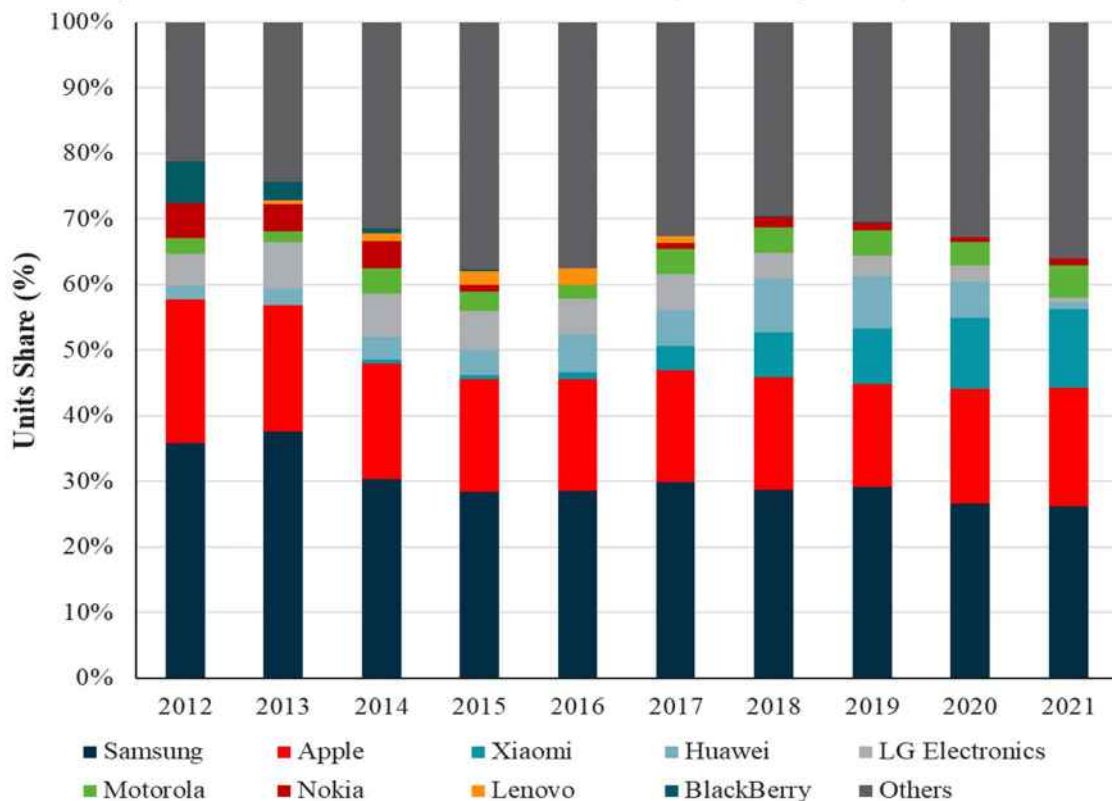
<sup>17</sup> *See, e.g.*, Pew Research Center, “Mobile Fact Sheet,” April 7, 2021, available at [pewresearch.org/internet/fact-sheet/mobile/](https://www.pewresearch.org/internet/fact-sheet/mobile/).

<sup>18</sup> Note the worldwide smartphone users include China. *See* Statista, “Number of smartphone subscriptions worldwide from 2016 to 2027,” July 27, 2022, available at <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>; The world population in 2021 was almost 7.9 billion. United Nations, “World Population Day,” available at <https://www.un.org/en/observances/world-population-day>.

<sup>19</sup> *See, e.g.*, Pew Research Center, “Mobile Fact Sheet,” available at [pewresearch.org/internet/fact-sheet/mobile/](https://www.pewresearch.org/internet/fact-sheet/mobile/).

the largest OEMs in terms of U.S. smartphone market share.<sup>20</sup> Google sells its own smart mobile devices, primarily the Pixel smartphones and tablets.<sup>21</sup> OEM market shares for smartphones are depicted in Exhibit 1 below. This shows that OEM market shares have been dynamic during that timeframe. Larger players in 2012 (including Nokia, LG and BlackBerry) had shares below 2% by 2021.

**Exhibit 1**  
**Smartphone OEM Market Shares Worldwide (excluding China), 2012 – 2021**



Source: IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

32. Smart mobile devices rely on cellular and wireless fidelity (“Wi-Fi”) technology to communicate. The cellular network is a high-capacity communication network distributed over cell

<sup>20</sup> See O’Dea, S., “United States (U.S.) market share of smartphone original equipment manufacturers (OEMs) in the 1<sup>st</sup> quarter 2021,” *Statista*, July 12, 2021, available at <https://statista.com/statistics/1187356/smartphone-original-equipment-manufacturers>.

<sup>21</sup> See Jobanputra, Soniya, “Pixel 6a: More of what you want for less than you expect,” *Google*, May 11, 2022, available at <https://blog.google/products/pixel/pixel-6a-io-2022/>.



sites that enables wireless transmission of voice calls and data.<sup>22</sup> A wireless standard defines the protocols for communication between the different components of a cellular network such as the base stations and mobile devices themselves.<sup>23</sup> Standard-setting organizations around the world have developed common wireless cellular systems, which have advanced in subsequent releases known as generations.<sup>24</sup> Since the introduction of the second generation (“2G”) digital cellular system in the early 1990s,<sup>25</sup> “[s]ignificant advances were made with the introduction of third generation (‘3G’) mobile broadband in the early 2000s, and innovation continue[d] ... with much faster and efficient wireless fourth (‘4G’) and ... fifth generation (‘5G’) systems.”<sup>26</sup> “Utilization of the mobile wireless networks for internet browsing, emailing, gaming, and mobile applications would not be possible without the high data rates enabled by core communications technology incorporated in the cellular standards.”<sup>27</sup>

33. As smartphone adoption grew, so did the adoption of mobile internet services. The number of mobile subscribers reached 327 million (83% of the region’s population) by 2020 in

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<sup>22</sup> See, e.g., Samsung, “What is a Cellular network or Mobile network?” October 27, 2020, available at <https://www.samsung.com/in/support/mobile-devices/what-is-a-cellular-network-or-mobile-network/>; Long, Moe, “What is Mobile Data? Everything You Need to Know,” *WhistleOut*, April 15, 2022, available at <https://www.whistleout.com/CellPhones/Guides/mobile-data>; and Hardesty, George, “Cellular Wireless Technologies: 5G, LTE / 4G, GSM / 3G, 2G and 6G,” *Data Alliance*, September 11, 2020, available at <https://www.data-alliance.net/blog/cellular-wireless-technologies-5g-lte-4g-gsm-3g-2g-and-6g/>.

<sup>23</sup> IEEE Standard Association, “What are Standards? Why are They Important?” January 11, 2021, available at <https://beyondstandards.ieee.org/what-are-standards-why-are-they-important/> (“Standards form the fundamental building blocks for product development by establishing consistent protocols that can be universally understood and adopted. This helps fuel compatibility and interoperability and simplifies product development, and speeds time-to-market.”) and Kernighan, Brian W., *Understanding the Digital World: What You Need to Know About the Internet, Privacy, and Security*, First Edition, Princeton, NJ: Princeton University Press, 2017, at p. 132 (“Phones talk to the closest base station, and when they move from one cell to another, a call in progress is handed off from the old base station to the new one [...]. Cell sizes vary, from a few hundred meters to a few tens of kilometers.”).

<sup>24</sup> 3GPP, “About 3GPP,” available at <https://www.3gpp.org/about-3gpp> (“The 3GPP technologies from these groups are constantly evolving through Generations of commercial cellular / mobile systems. With LTE and 5G work, 3GPP has become the focal point for the vast majority of mobile systems beyond 3G. Although these Generations have become an adequate descriptor for the type of network under discussion, real progress on 3GPP standards is measured by the milestones achieved in particular Releases.”). See also Gupta, Kirti, “Technology Standards and Competition in the Mobile Wireless Industry,” *George Mason Law Review*, Vol. 22, 2014-2015, pp. 865-874 (hereafter “Gupta (2014-2015)”), at p. 865 and p. 874.

<sup>25</sup> Gupta (2014-2015), p. 865.

<sup>26</sup> Gupta (2014-2015), p. 865.

<sup>27</sup> Gupta (2014-2015), p. 874.



North America with the 4G network accounting for 87% of mobile internet connections.<sup>28</sup> Globally, the total number of mobile subscribers reached 5.1 billion (66% of population) in 2018 and is expected to grow to 5.7 billion (71% of population) by 2023.<sup>29</sup>

34. Providers of cellular networks are called MNOs or “carriers.” The leading MNOs in the U.S. are AT&T, Verizon, and T-Mobile, which had a combined market share of 98.9% in the last quarter of 2021.<sup>30</sup> MNOs often collaborate with OEMs and OS developers to ensure mobile device users can access mobile services such as voice calls and internet data on their devices.<sup>31</sup> Meanwhile, the adoption of mobile internet has been increasing quickly.<sup>32</sup> In addition, and as discussed further in Section IV.B.5 below, carriers may also be involved in app distribution and in-app payments in the form of billing services.

## 2. *Mobile Operating Systems*

35. OEMs install mobile OSs on mobile devices to support general purpose functions such as access to cameras, internet connections, voice and text communications, as well as the installation, operation, and update of native mobile applications.<sup>33</sup> Smartphones require a more advanced mobile OS than do feature phones; for instance, smartphone OSs must support a

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<sup>28</sup> See, e.g., GSMA, “The Mobile Economy North America 2021,” available at [https://www.gsma.com/mobileeconomy/wpcontent/uploads/2021/10/GSMA\\_ME\\_NorthAmerica\\_2021\\_Infographics\\_Spreads.pdf](https://www.gsma.com/mobileeconomy/wpcontent/uploads/2021/10/GSMA_ME_NorthAmerica_2021_Infographics_Spreads.pdf).

<sup>29</sup> See, e.g., Cisco, “Cisco Annual Internet Report (2018–2023) White Paper,” March 9, 2020, available at <https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html>.

<sup>30</sup> See, e.g., Statista, “Wireless subscriptions market share by carrier in the U.S. from 1<sup>st</sup> quarter 2011 to 2<sup>nd</sup> quarter 2022,” September 9, 2022, available at <https://www.statista.com/statistics/199359/market-share-of-wireless-carriers-in-the-us-by-subscriptions/>.

<sup>31</sup> See, e.g., Verizon, “Smartphones. Do More of the Things You Love,” available at <https://web.archive.org/web/20120301094107/http://www.verizonwireless.com/b2c/explore/?page=smartphones>; and Brady (Google) Deposition, pp. 160-161 (describing “technical integrations” with “mobile carriers or OEMs from an engineering perspective”).

<sup>32</sup> See Pew Research Center, “Mobile Fact Sheet,” April 7, 2021, available at [pewresearch.org/internet/fact-sheet/mobile/](https://www.pewresearch.org/internet/fact-sheet/mobile/).

<sup>33</sup> See, e.g., Steele, Colin, “Mobile operating system,” *TechTarget*, March 2020, available at <https://www.techtarget.com/searchmobilecomputing/definition/mobile-operating-system>. See also Tanenbaum, Andrew and Herbert Bos, *Modern Operating Systems*, Fourth Edition (Global Edition), London, UK: Pearson Education Limited, 2015, pp. 19-20, at pp. 19-20.

touchscreen user interface that supports advanced application operability.<sup>34</sup> For the remainder of this report, I use the term “smart mobile OSs” as OSs designed specifically for smartphones and tablets (*i.e.*, smart mobile devices) that have advanced functionality such as a touchscreen user interface.

36. Broadly speaking, smart mobile OSs on smartphones and tablets can be proprietary or licensable. Proprietary (*i.e.*, non-licensable) smart mobile OSs are developed and used exclusively by a particular OEM. Notably, Apple has developed its own proprietary smart mobile OS called iOS, which is available for use exclusively on iPhones and iPads.<sup>35</sup> Companies such as Google and Microsoft developed mobile OSs and license them (or make them available) to third-party OEMs for installation on their smart mobile devices.<sup>36</sup> As shown in Exhibit 3 below, most smart mobile devices today run a licensable OS, which is mainly Android.<sup>37</sup>

37. As described in Section IV.A.1, the first mobile device with the Android OS shipped in the fall of 2008. As presented in Exhibit 2 below, since 2013, over 70% of smartphones

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<sup>34</sup> Email from Monma Junichi, Google, to Toru Kawamura, Google, “Subject: Re: Non-Touch, No 3<sup>rd</sup>-party apps Android phones,” December 16, 2014, GOOG-PLAY-000450926-931, at 927 (“If GMS and Play are preloaded to the device, I believe the device should support the touch screen for app interoperability.”). Although some feature phone models are installed with touchscreens, these touchscreens either only support basic functions such as web-browsing or have a small screen size that violates Google’s requirement for Android compatibility. *See* Email from to Unsuik Jung, Google, to Pranab Mookken, Google, “Subject: Re: Device approval?” April 18, 2018, GOOG-PLAY-000433886.R-891.R, at 887.R (“This device is a non-compatible Android device because, while it has touchscreen, it only has a screen size of 2.4” (which violates the 2.5” screen size CDD requirement for handhelds).”). *See also* Sirois, Sophie, “How Do Touch Screens Work on Laptops and Tablets?” *HP*, December 12, 2018, available at <https://www.hp.com/us-en/shop/tech-takes/how-do-touch-screens-work>; and Computer World, “Nokia unveils trio of touchscreen feature phones,” June 6, 2012, available at <https://www.computerworld.com/article/2504064/nokia-unveils-trio-of-touchscreen-feature-phones.html>.

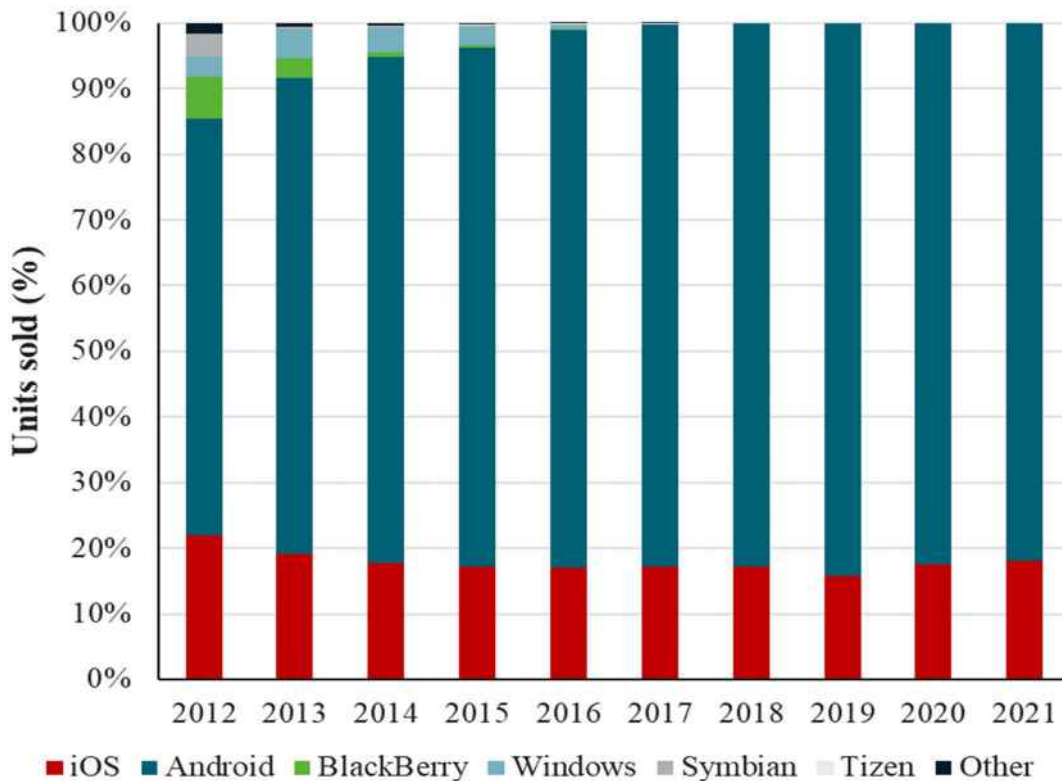
<sup>35</sup> Investopedia, “Apple iOS,” October 25, 2021, available at <https://www.investopedia.com/terms/a/apple-ios.asp>. Although iPads for many years ran a variant the iOS used in smart phones, Apple renamed the mobile OS designed for iPads as “iPadOS” in 2019. For purposes of this report, I use “iOS” to refer to both iOS and iPadOS. *See* Wuerthele, Mike, “Apple unveils iPadOS, adding features specifically to iPad,” *Apple Insider*, June 3, 2019, available at <https://appleinsider.com/articles/19/06/03/apple-supplements-ios-13-with-new-tablet-specific-ipad-os-branch>.

<sup>36</sup> Google, “Androids: The Team that Built the Most popular Operating System Ever,” GOOG-PLAY-004456799-269, at 044 (“Microsoft licensed their OS to manufacturers like HTC”); and Vaughan-Nichols, Steven, “Debunking four myths about Android, Google, and open-source,” *ZDNet*, February 18, 2014, available at <https://www.zdnet.com/article/debunking-four-myths-about-android-google-and-open-source/>.

<sup>37</sup> *See also* “Google Android,” European Commission Directorate-General of Competition, Case No. AT.40099, European Commission Decision, July 18, 2018 (hereafter “EC Google Android Decision”), at ¶ 446.

worldwide (excluding China) use Google's Android OS, with the figure reaching 82% in 2021.<sup>38</sup> Exhibit 2 below also shows the expansion of Android's market share worldwide from 2012 to 2021; Android's share of smartphones sold worldwide grew from around 63% to 82%, while iOS's share remained between 16% to 22%.

**Exhibit 2**  
**Smart Mobile OS Market Shares Worldwide (excluding China), 2012 – 2021**

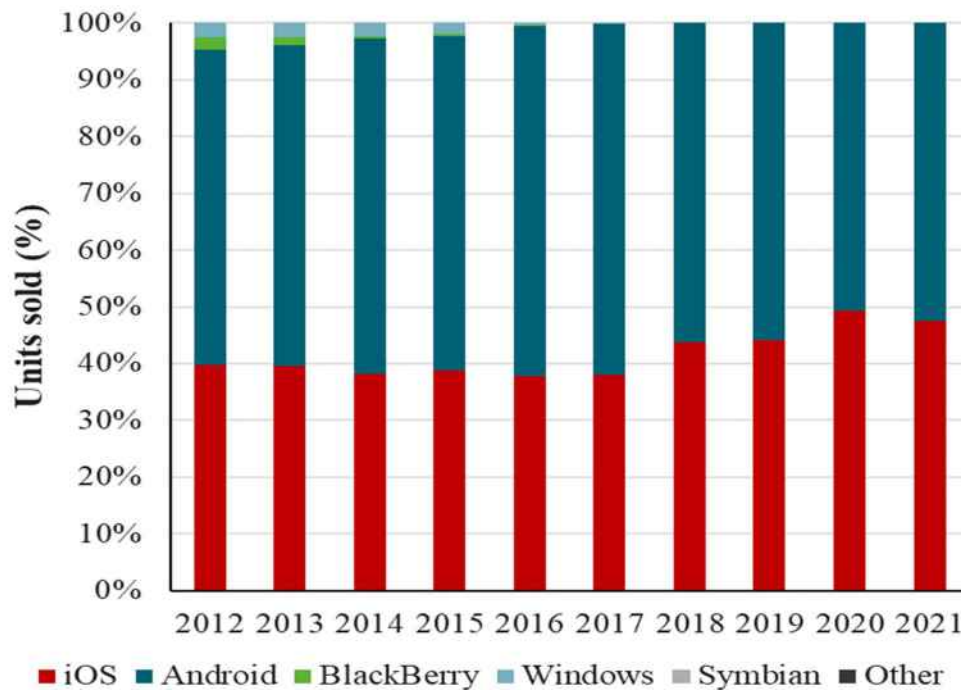


Source: IDC, "IDC Quarterly Mobile Phone Tracker," 2021Q4 Historical Release, February 11, 2022.

38. Exhibit 3 below, which depicts Android's market share in the U.S. from 2012 to 2021, shows that, unlike the worldwide market, Android's share of smartphones sold in the U.S. has fluctuated between 51% and 62% during this period, and iOS's share has grown from 40% in 2012 to 48% by 2021.

<sup>38</sup> Reynolds, Matt, "If you can't build it, buy it: Google's biggest acquisitions mapped," *Wired*, November 25, 2017, available at <https://www.wired.co.uk/article/google-acquisitions-data-visualisation-infoporn-waze-youtube-android>.

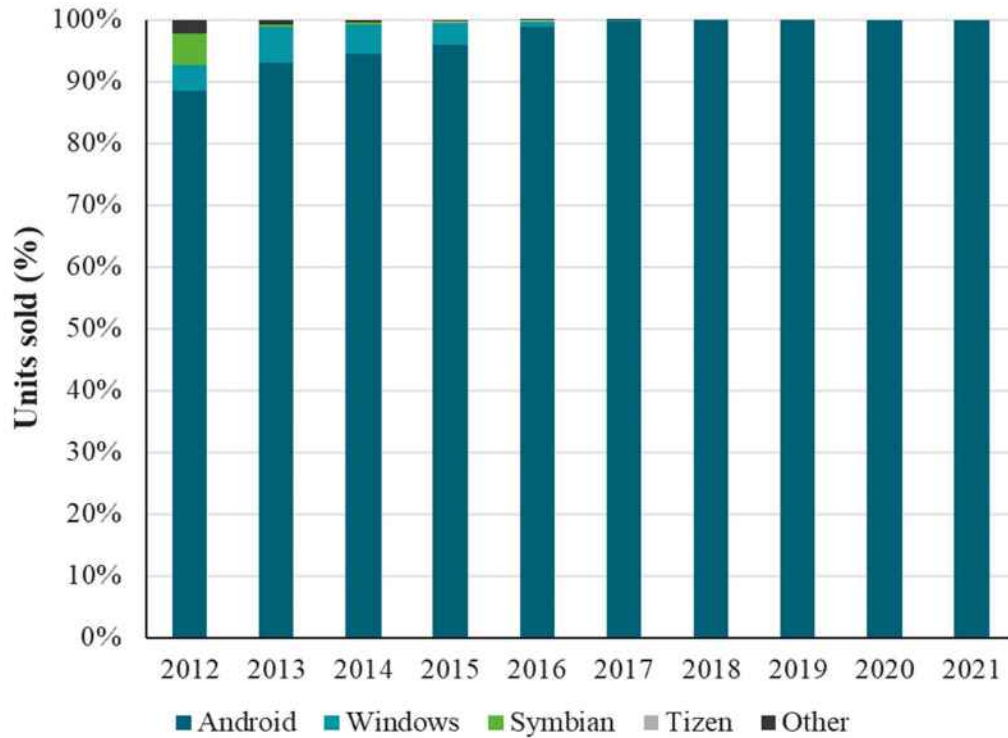
**Exhibit 3**  
**Smart Mobile OS Market Shares in the U.S., 2012 – 2021**



Source: IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

39. Exhibit 4 below shows that, within licensable smart mobile OSs (*i.e.*, removing iOS and BlackBerry OS from Exhibit 2 above), Android’s share of smart mobile devices sold worldwide (excluding China) increased from around 89% in 2012 to 99% by 2017 and beyond.

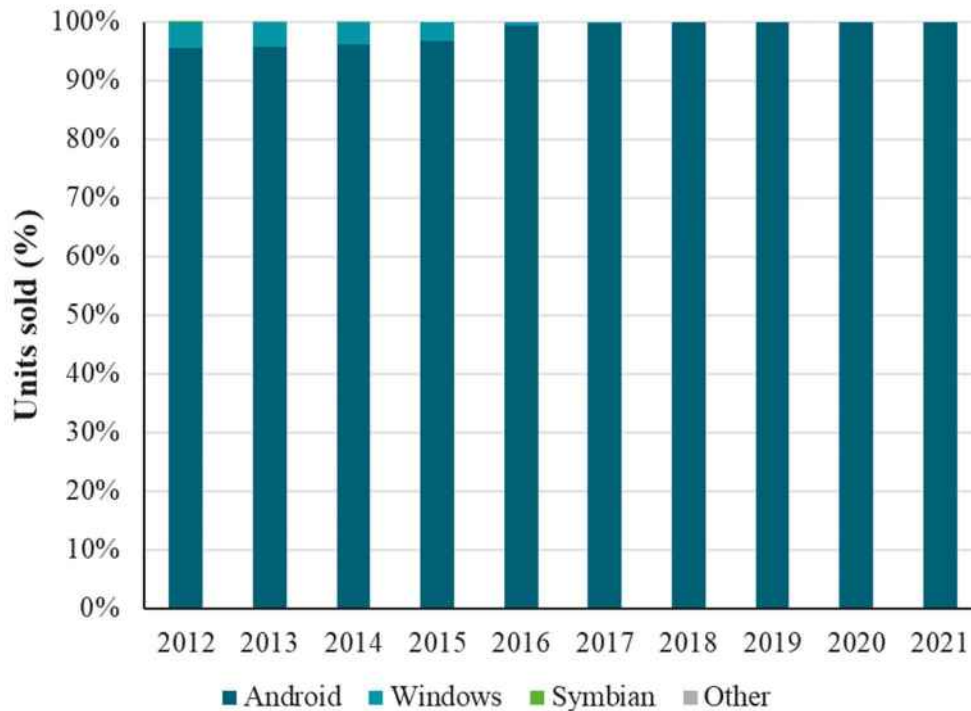
**Exhibit 4**  
**Licensable Smart Mobile OS Market Shares Worldwide (excluding China), 2012 – 2021**



*Source:* IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

40. Similarly, Exhibit 5 below shows that within licensable smart mobile devices sold in the U.S., Android’s share increased from 96% in 2012 to 100% by 2018, a share it has maintained through 2021.

**Exhibit 5**  
**Licensable Smart Mobile OS Market Shares in the U.S., 2012 – 2021**



Source: IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

### 3. *Mobile Applications*

41. A mobile application or “app” is software separate from the mobile OS that runs on a smart mobile device and adds specific functionalities to the device. Once an app is installed on a smart mobile device, the device displays the app’s icon in the user interface and the user taps the icon to run the app.<sup>39</sup> Even basic mobile device functionality like the dialer (i.e., phone app)<sup>40</sup> and contacts list are, in fact, applications separate from the OS.<sup>41</sup> Around 3.5 million different

<sup>39</sup> Mroczkowska, Agnieszka, “What is a Mobile App? | App Development Basics for Businesses,” *Droids on Roids*, February 1, 2021, available at <https://www.thedroidsonroids.com/blog/what-is-a-mobile-app-app-development-basics-for-businesses>.

<sup>40</sup> Android, “Overview,” August 2, 2022, available at <https://source.android.com/docs/devices/automotive/hmi/dialer>.

<sup>41</sup> Google, “Android-Platform-Packages-Apps,” available at <https://android.googlesource.com/platform/packages/apps/> (explaining that the Contacts app contains the “UI for the Contacts, Call log, and Dialer applications”).

applications were available for download on Android smart mobile devices in 2021.<sup>42</sup> In 2020, according to data from data.ai (formerly App Annie), there were over 90.4 billion application downloads on from the Google Play Store, and Android users spent \$27.1 billion on mobile applications (both initial downloads and in-app content) on the Google Play Store, an increase of 23.7% percent in terms of revenue compared to 2019.<sup>43</sup> According to data from data.ai, the vast majority (99.9% in 2020) of Android applications downloaded from the Google Play Store were free.<sup>44</sup>

42. There are many categories of apps, and, according to Google, 83% of apps on the Google Play Store in the first quarter of 2022 were not gaming apps.<sup>45</sup> Common types of apps include social media (*e.g.*, TikTok and Instagram), video streaming apps (*e.g.*, YouTube and Disney Plus), food and drinks (*e.g.*, DoorDash), and travel (*e.g.*, Airbnb and Uber), among others.<sup>46</sup> The most downloaded Android apps from the Google Play Store worldwide in 2020 were WhatsApp, TikTok, Instagram, Zoom, Facebook, Google Meet, and Snapchat.<sup>47</sup> The largest Android apps worldwide in terms of revenue are Google One (forecast to capture over \$1 billion consumer spending in 2021), Piccoma, Disney Plus, TikTok, and HBO Max.<sup>48</sup> As shown in Exhibit 6, in the

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<sup>42</sup> See, *e.g.*, Ceci, L., “Number of apps available in leading app stores as of 2<sup>nd</sup> quarter 2022,” *Statista*, August 11, 2022, <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>.

<sup>43</sup> See Rysman Workpapers. For 2021 figures, *see also, e.g.*, Chan, Stephanie, “Global Consumer Spending in Mobile Apps Reached \$133 Billion in 2021, Up Nearly 20% from 2020,” *SensorTower*, December 7, 2021, available at <https://sensortower.com/blog/app-revenue-and-downloads-2021>.

<sup>44</sup> See Rysman Workpapers.

<sup>45</sup> For example, according to Play Console Help, Google has 32 app categories. See Google, “Choose a category and tags for your app or game,” available at <https://support.google.com/googleplay/android-developer/answer/9859673?hl=en#zippy=%2Capps%2Cgames>. In addition, Google’s monthly app revenue data includes 35 app categories and 18 game categories. See Rysman Workpapers. Also, in the first quarter of 2022, the number of gaming apps on the Google Play Store is about 449,000 out of 2.592 million apps in total. See Clement, J., “Number of available gaming apps in the Google Play Store from 1st quarter 2015 to 2nd quarter 2022,” *Statista*, August 30, 2022, available at <https://www.statista.com/statistics/780229/number-of-available-gaming-apps-in-the-google-play-store-quarter/> and Ceci, L., “Number of available applications in the Google Play Store from December 2009 to March 2022,” *Statista*, July 27, 2022, available at <https://www.statista.com/statistics/266210/number-of-available-applications-in-the-google-play-store/>.

<sup>46</sup> See, *e.g.*, Data.ai, “State of Mobile 2022,” available at <https://www.data.ai/en/go/state-of-mobile-2022>.

<sup>47</sup> See Rysman Workpapers.

<sup>48</sup> See, *e.g.*, Chan, Stephanie, “Global Consumer Spending in Mobile Apps Reached \$133 Billion in 2021, Up Nearly 20% from 2020,” *Sensor Tower*, December 7, 2021, available at <https://sensortower.com/blog/app-revenue-and-downloads-2021>.



U.S., the three most popular apps in terms of installations are TikTok, YouTube, and Facebook, and YouTube, Tinder, and HBO Max are ranked the top three in terms of consumer spend.

**Exhibit 6**  
**Rank of Apps in the U.S. by Downloads, Consumer Spend, and Active Users, 2021**

United States		
DOWNLOADS	CONSUMER SPEND	MONTHLY ACTIVE USERS
1 TikTok (Short Videos (Entertainment))	1 YouTube (Video Sharing (Entertainment))	1 Facebook (Social Networks (Social Media))
2 YouTube (Video Sharing (Entertainment))	2 Tinder (Dating (Social Media))	2 Facebook Messenger (Communication (Social Media))
3 Facebook (Social Networks (Social Media))	3 HBO Max (OTT (Entertainment))	3 Amazon (E-Commerce (B2C) (Shopping))
4 Instagram (Media Sharing Networks (Social Media))	4 Disney+ (OTT (Entertainment))	4 Instagram (Media Sharing Networks (Social Media))
5 Facebook Messenger (Communication (Social Media))	5 Pandora Music (Music & Audio (Entertainment))	5 TikTok (Short Videos (Entertainment))
6 ZOOM Cloud Meetings (Meeting (Business))	6 Twitch (Live Streaming (Entertainment))	6 Snapchat (Media Sharing Networks (Social Media))
7 Cash App (Digital Wallets & Payment (Finance))	7 TikTok (Short Videos (Entertainment))	7 Netflix (OTT (Entertainment))
8 Netflix (OTT (Entertainment))	8 Google One (File Management (Utility & Productivity))	8 Spotify (Music & Audio (Entertainment))
9 HBO Max (OTT (Entertainment))	9 Bumble App (Dating (Social Media))	9 Pinterest (Media Sharing Networks (Social Media))
10 Snapchat (Media Sharing Networks (Social Media))	10 Hulu (OTT (Entertainment))	10 WhatsApp Messenger (Communication (Social Media))

*Note:* The data are combined iOS and Google Play.

*Source:* Data.ai, “State of Mobile 2022,” available at <https://www.data.ai/en/go/state-of-mobile-2022>.

## B. Development of Mobile Applications

43. App developers are the designers, builders, testers, and distributors of apps, ranging from large enterprises to single individuals.<sup>49</sup> Developers design apps “with the limitations and features of mobile devices in mind. For example, a game could make use of a smartphone’s accelerometer, or a drawing pad app could make use of a tablet’s stylus.”<sup>50</sup> To function, mobile applications must be written in a programming language compatible with the mobile device OS. Different mobile operating systems require different programming languages. For example,

<sup>49</sup> See, e.g., Subramaniam, Pia, “Top App Development Companies (2022)” *Business of Apps*, September 19, 2022, available at <https://www.businessofapps.com/app-developers/>.

<sup>50</sup> See, e.g., Ceci, L., Statista, “Mobile app usage - Statistics & Facts,” *Statista*, October 14, 2021, available at [statista.com/topics/1002/mobile-app-usage](https://www.statista.com/topics/1002/mobile-app-usage). An accelerometer on a smart mobile device is “a sensor that enables users with an upgraded experience by adjusting an orientation of the app screen in the smartphone and tablet. The core objective of the mobile phone accelerometer is, the device adapts the orientation as per the device position from horizontal to vertical and vice-versa. To provide a comfortable viewing experience to the users, it measures the position and orientation change of the screens.” See Sharma, Sagar, “What is Accelerometer? How to Use Accelerometer in Mobile Devices,” *Credencys*, July 2, 2020, available at <https://www.credencys.com/blog/accelerometer/>.



converting an Android app (which is based on Kotlin or Java) to iOS requires developers to rewrite the codes in Swift or Objective-C so it can interact with iOS application programming interfaces (“APIs”).<sup>51</sup> Taking the code for an iOS app and downloading it to an Android mobile device would result in a non-functional app that cannot run on Android.<sup>52</sup> While there are some development tools that allows developers to build apps on one codebase across operating systems and platforms (*e.g.*, mobile, web, desktop),<sup>53</sup> these tools do not appear to be widely adopted by the developer community, as developers prefer to build native apps for Android and iOS to optimize the unique functionalities of each mobile OS.<sup>54</sup> As a result, developers must spend time and resources to develop a different app for a different OS.<sup>55</sup>

44. App developers must decide for which mobile OS ecosystem(s) they want to develop mobile apps, how to distribute them, and whether and how to receive payment for apps or purchases

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<sup>51</sup> See, *e.g.*, Ilyukha, Vitaliy, “How to Port Android Apps to iOS?,” *Jelvix*, available at <https://jelvix.com/blog/porting-android-apps-to-ios>.

<sup>52</sup> For example, apps written for iOS require specific technical elements to support hardware and software features, such as the Apple Touch ID fingerprint scanner and iOS notification widgets that will not function on Android devices. See Email from Marcy, to Eric Schmidt, Google, “Subject: Your session will be great!” January 9, 2012, GOOG-PLAY-008156711-712, at 712 (“Android apps can’t run on Apple products, just as Apple apps can’t run on Android.”). See also Dury (GetJar) Deposition, p. 69 (“Q. Could a developer take the iOS version of an app and simply distribute that on Android without making any changes? . . . The Witness: . . . iOS applications didn’t run on Android, so there must have been some changes . . . Android apps did not run on iOS.”); and Costello, Sam, “Can you Run iPhone Apps on Android and Windows?,” *Lifewire*, March 20, 2021, available at <https://www.lifewire.com/running-iphone-apps-android-and-windows-1999072>.

<sup>53</sup> One example of the cross-platform development tool is the Google-owned Flutter. See Flutter, “Build Apps for Any Screen,” available at <https://flutter.dev>.

<sup>54</sup> See Competition and Markets Authority, “Mobile ecosystems – Market study Final report,” June 10, 2022, available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1096277/Mobile\\_ecosystems\\_final\\_report\\_-\\_full\\_draft\\_-\\_FINAL\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1096277/Mobile_ecosystems_final_report_-_full_draft_-_FINAL_.pdf) (hereafter “CMA Final Report on Mobile Ecosystems”), ¶¶ 4.160-4.161.

<sup>55</sup> Brady (Google) Deposition, p. 72 (“3 Q. So part of the friction that you were just describing is the programming difficulty of having to design an app that’s compatible on a whole series of incompatible mobile operating systems. Right? A. No. I think – so you don’t design an app that’s compatible with those. You have to design different apps for different operating systems. Q. Right. . . . So part of the friction for developers that you were describing is having to design different apps for different mobile operating systems. Right? A. Yup, that’s correct.”); and Dury (GetJar) Deposition, pp. 163-164; Morrill (Amazon) Deposition, p. 259 (“Q. Got it. Can I download iOS apps from the Amazon Appstore? A. No, you cannot. Q. Why is that? A. The Amazon Appstore was written as an Android-based store. It’s a different code base. You’re talking about native apps here, so native apps that are native to Android don’t run on iOS and the opposite is the case as well.”).

made through apps. As detailed below, due to network effects<sup>56</sup>, an ecosystem and OS will become more valuable to developers as the number of users increases.

45. Since Android and iOS are the two leading mobile OSs with the largest user base in the U.S. (and globally), app developers have an incentive to develop apps for both platforms.<sup>57</sup> First, as explained in greater detail below in Section V.C.4, Android and iOS have large installed bases of users that primarily use a mobile device within that particular mobile OS ecosystem (most mobile device owners have only a single smartphone, for example).<sup>58</sup> This is a practice known as “single-homing.” Developers therefore likely do not view Android users and iOS users as substitutes; rather, developers recognize these two user bases as separate but complementary populations that together form nearly all of the customer base available to consume apps.<sup>59</sup> Second, some apps—such as social networking, dating, ridesharing, and gaming apps—run “cross-platform,” that is, on a system shared by users of both Android and iOS devices.<sup>60</sup> These apps often

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<sup>56</sup> I discuss network effects in Section V.A.2 below.

<sup>57</sup> See, e.g., Bresnahan, Timothy, Joe Orsini, and Pai-Ling Yin, “Demand heterogeneity, inframarginal multihoming, and platform market stability: Mobile apps,” Working Paper, September 2015, available at <https://digital.hbs.edu/wp-content/uploads/2017/12/Demand-Heterogeneity-Inframarginal-Multihoming-and-Platform-Market-Stability-Mobile-Apps.pdf>, pp. 24, and 28. Android and iOS are the two leading OSs among all types of smart mobile devices. See Statcounter, “Mobile Operating System Market Share United States Of America,” available at <https://gs.statcounter.com/os-market-share/mobile/united-states-of-america> and Statcounter, “Mobile Operating System Market Share Worldwide,” available at <https://gs.statcounter.com/os-market-share/mobile/worldwide>.

<sup>58</sup> Compass Lexecon, “An economic assessment of the effects of Apple’s Licence Agreement with Spotify,” April 9, 2019, STATEAGS\_0023196-250, at 202 (“[M]any consumers have one smartphone and/or do not multi-home between the Android and iOS platforms”). See also CMA Final Report on Mobile Ecosystems, ¶ 3.39 (“Most users appear to only have smartphones that use one operating system – 80% of users appear to only use one smartphone and evidence suggests that even when users are purchasing an additional smartphone, it is normally one using the same operating system”).

<sup>59</sup> As I discussed in my chapter, competing platforms are seen as complementary products by agents on one side with the presence of single-homing agents on the other side. See Jullien, Bruno, Alessandro Pavan, and Marc Rysman, “Two-sided Markets, Pricing, and Network Effects,” *Handbook of Industrial Organization*, Vol. 4, No. 1, 2021, pp. 485-592 (hereafter “Jullien (2021)”), at p. 43.

<sup>60</sup> Email from Google Alerts, Google, to Eric Chu, former Engineering Director for Google, “Subject: Google Alert - android,” October 31, 2016, GOOG-PLAY-001085889-890, at 889 (“Both iOS and Android users have the opportunity to use WhatsApp on their devices, and millions of them do.”). See also Lyft, “Phone software recommendations and settings,” available at <https://help.lyft.com/hc/en-us/all/articles/115013080508-Phone-software-recommendations-and-settings>; Matthews, Dylan, “9 questions about the dating app Hinge you were too embarrassed to ask,” *Vox*, March 19, 2015, available at <https://www.vox.com/2015/3/19/8257357/hinge-explained>; and Cash, Adam, “Top 16 iOS Android Cross-Platform Games,” *iSkysoft*, May 5, 2022, available at <https://www.iskysoft.com/phone-transfer/ios-android-cross-platform-games.html>.

become more valuable as more consumers use the app, which further incentivizes developers to develop an app for both platforms. .

46. Moreover, because users of mobile OSs largely single-home (meaning they have a single smart mobile device or prefer to maintain their smart mobile devices on one OS, typically iOS or Android), for developers, choosing one OS over the other would risk losing scale and leaving market share open to competitors willing to design cross-platform apps.<sup>61</sup> Many developers therefore develop apps for both Android and iOS (*i.e.*, the developers “multi-home” by targeting both user groups). According to App Annie, all of the top 100 apps on the Google Play store are also available on the Apple App Store.<sup>62</sup> Further, Google notes that “78% of developers offer apps on two or more platforms”<sup>63</sup> and that “app developers typically multi-home across different operating systems.”<sup>64</sup>

### **C. Distribution of Mobile Applications**

47. App developers can distribute apps to Android smart mobile device users in three main ways: (i) through Android app stores like the Google Play Store; (ii) by reaching an agreement with an OEM or carrier to pre-load the app on an Android smart mobile device before sale to the end-user; or (iii) directly to Android smart mobile device users via a download from the developer’s

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<sup>61</sup> Economic theory suggests that the incentives for agents on one side to multi-home are inversely related to the measure of agents who multi-home on the other side of a platform. For instance, in a market of morning and evening newspapers, readers may read only a single newspaper, whereas advertisers who want to reach all newspaper readers would choose to place ads in all of them. Since the majority of smart mobile device users single-home on one mobile OS, developers tend to multi-home across mobile OSs to benefit from greater interactions and the differentiation of both Android and iOS. *See* Jullien (2022) at p. 43 and Rysman, Marc, “The Economics of Two-Sided Markets,” *Journal of Economic Perspectives*, Vol. 23, No. 3, 2009, pp. 125-143 (hereafter “Rysman (2009)”), at p. 130. *See also* CMA Final Report on Mobile Ecosystems, ¶¶ 4.162-4.180.

<sup>62</sup> *See* Appendix C.

<sup>63</sup> *See, e.g.*, Google, “App Distribution and the GMS Suite,” GOOG-PLAY-001497762-785, at 784.

<sup>64</sup> *See* CMA Final Report on Mobile Ecosystems, ¶ 4.148.

own website or a third-party website, colloquially known as “sideloading.”<sup>65,66</sup> In addition, while Android users can access web apps through a browser on their Android smart mobile devices, rather than from a native app installed on the device, web apps do not provide consumers the same level of utility as native apps because of the inferior user experience, as discussed further in Section V.C.4.<sup>67</sup>

### 1. App Stores

48. App stores are online marketplaces that allow users to search for, download, and install a range of apps onto their smart mobile devices.<sup>68</sup> While apps are available to users either for free or for a charge in app stores, developers are usually required to pay a registration fee to publish any apps, free or paid.<sup>69</sup> App stores themselves are apps; specifically, a type of software compatible with the OS on which they are built. The Apple App Store is the proprietary app store on iOS and

<sup>65</sup> See, e.g., Android Developers, “Publish your app,” August 10, 2022, available at <https://developer.android.com/studio/publish>; Lim (Google) Deposition, pp. 273-274 (“Q. So you can get them through the Google Play Store but they are also available either preinstalled or by direct distribution, what other mechanism? A. As you know, any app can [have] multiple means of getting distributed such as negotiating to be preinstalled by an OEM, carrier deals or sideloaded”); and Kleidermacher (Google) Deposition, p. 139 (“Q. And just so we’re clear on that, sideloading would include any kind of installation from a developer’s own website, correct? A. Yes.”).

<sup>66</sup> To a much lesser extent, developers can also in theory reach users through peer-to-peer (p2p) sharing by end-users to each other over email, local WiFi, Bluetooth, or hard media storage such as SD Cards and hard drives; such practices are more common in remote areas with limited cellular access. In particular, p2p file transfer apps such as ShareIt are gaining popularity in low bandwidth regions including India. See Google, “Play Performance Metrics,” January 14, 2019, GOOG-PLAY-000464354.R-400.R, at 394.R (“[REDACTED] of device installs in IN attributed to sideloading [REDACTED] [REDACTED];” ShareIt (and other file transfer apps) are widely used by shopkeepers to sideload apps”) and Google, Untitled, GOOG-PLAY-000801782-784, at 782 (“In low bandwidth regions like India using apps like ShareIT to p2p apps from other devices when wifi or cellular is too expensive”). See also Staltz, André, “Nov 2019 update,” *Manyverse Blog*, November 5, 2019, available at <https://www.manyver.se/blog/2019-11-update> (describing sharing of the app to “off grid” users in Mexico and Brazil).

<sup>67</sup> Email from Mike Cleron, Google, to Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems for Google, “Subject: Re: Re: Making the web platform better on Android,” December 10, 2014, GOOG-PLAY-004449004-006, at 004 (“Web apps are, in general, bad for consumers. Our UX posse actually bans Google-authored apps that are APK wrappers for WebViews because they offer an inferior experience and it is almost impossible for them to follow our platform guidelines”).

<sup>68</sup> See Lim (Google) Deposition, p. 80 (describes the functions of an app store as “I can download any of those apps, I can search, I can browse, I can find these apps, click on them and install them...”). See also EC Google Android Decision, ¶ 86.

<sup>69</sup> For example, there is a \$25 one-time registration fee for a developer to register to use the Google Play Console and thereby publish any number of apps to Google Play. *See* Google, “How to use Play Console,” available at <https://support.google.com/googleplay/android-developer/answer/6112435>. Apple charges a \$99 registration fee. *See* Apple, “Apple Developer Program,” available at <https://developer.apple.com/support/compare-memberships/>.

cannot be downloaded to Android smart mobile devices, while the Google Play Store is the dominant app store for Android OS and cannot be downloaded or installed to, or even operate on, iOS smart mobile devices.<sup>70</sup>

49. Besides the Google Play Store, there are several alternative app stores that can serve as app distribution channels on Android smart mobile devices, including the Amazon Appstore, and F-Droid, as well as the Samsung Galaxy Store, which is available only on Samsung devices.<sup>71</sup> However, competing Android app stores have much smaller user bases than the Google Play Store, even when they have relatively high installed bases. For instance, the Samsung Galaxy Store had 24 million monthly active users in 2017 in the U.S.,<sup>72</sup> and, according to Google documents, monthly active users on Samsung's Galaxy Store in March 2019 were only 19% of those on the Play Store (and time spent on the Galaxy Store was only 3% of time spent on the Play Store).<sup>73</sup> As discussed in Section VII, these alternative Android app stores may not be distributed to Android users through the Google Play Store, but instead can be pre-loaded on Android smart mobile devices by an OEM (in the case of the Samsung Galaxy Store on Samsung smart mobile devices) or sideloaded by Android users (in the case of Amazon Appstore, F-Droid, and others).

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<sup>70</sup> Balancing Act, "Mobile Apps for Africa," July 2011, GOOG-PLAY-005571079-209, at 191 ("Further access to Apple's Apps store is exclusive to Apple's phone owners;" "[P]otentially any manufacturer of smartphones can decide to run Android OS on its mobile phones and this further implies that every Android OS phone will come with access to Google's Android Market apps store.").

<sup>71</sup> Poetker, Bridget, "The Must-Know Mobile App Stores (Native and Third-Party Options)," *G2*, June 13, 2019, available at <https://www.g2.com/articles/app-stores>. See Samsung, "Frequently asked questions about Galaxy Store," available at <https://www.samsung.com/us/support/answer/ANS00076970/#:~:text=Galaxy%20Store%20for%20phone%20or%20tablet&text=Galaxy%20Store%20is%20only%20available%20on%20Samsung%20devices> ("Galaxy Store is only available on Samsung devices").

<sup>72</sup> Email from Vikram Natarajan, Google, to Guru Nagarajan, Google, "Subject: Re: Samsung Store position brief," April 30, 2017, GOOG-PLAY-008681354-355, at 354 ("New data on Galaxy store – now has 24M MAU in the US") and Takahashi, Dean, "Samsung Galaxy App Store gains ground in the U.S. with each smartphone launch," *Venture Beat*, April 22, 2017, available at <https://venturebeat.com/mobile/samsung-galaxy-app-store-gains-ground-in-the-u-s-with-each-smartphone-launch/>.

<sup>73</sup> Google, "Project Banyan // PM – HL," March 2019, GOOG-PLAY-001265881.R-922.R, at 883.R.

## 2. *Sideloading*

50. In addition to downloading apps from the Google Play Store or alternative Android app stores, users can also sideload apps onto their Android smart mobile devices.<sup>74</sup> “Sideloading” refers to the direct downloading and installation of Android installation packages (“APKs”) directly from websites, which allows users to bypass app store apps.<sup>75</sup> For instance, some popular gaming apps (*e.g.*, Fortnite) are available to Android users only through sideloading or an app store besides the Google Play Store.<sup>76</sup>

51. According to Google documents, sideloading is only possible on Android smart mobile devices if users change device settings to permit installations from “Unknown Sources” and click through system-generated warning messages that pop up throughout the sideloading process.<sup>77</sup> For example, in 2015, consumers who attempted to install the Amazon Underground App—a competing app store—received a series of warning messages as shown in Exhibit 7 below.

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<sup>74</sup> An equivalent form of app distribution off the App Store on iOS is called “jailbreak.” *See, e.g.*, Nield, David, “How to Install Apps From Outside Your Phone’s App Store,” *WIRED*, August 9, 2020, available at <https://www.wired.com/story/install-apps-outside-app-store-sideload/>.

<sup>75</sup> Note that Google internally refers to sideloading (or “off-Play installs”) as “users downloading an app from outside Google Play.” *See* Google, “Off-Play Installs (a.k.a. Sideloading),” October 7, 2016, GOOG-PLAY-000042623.R-639.R, at 625.R.

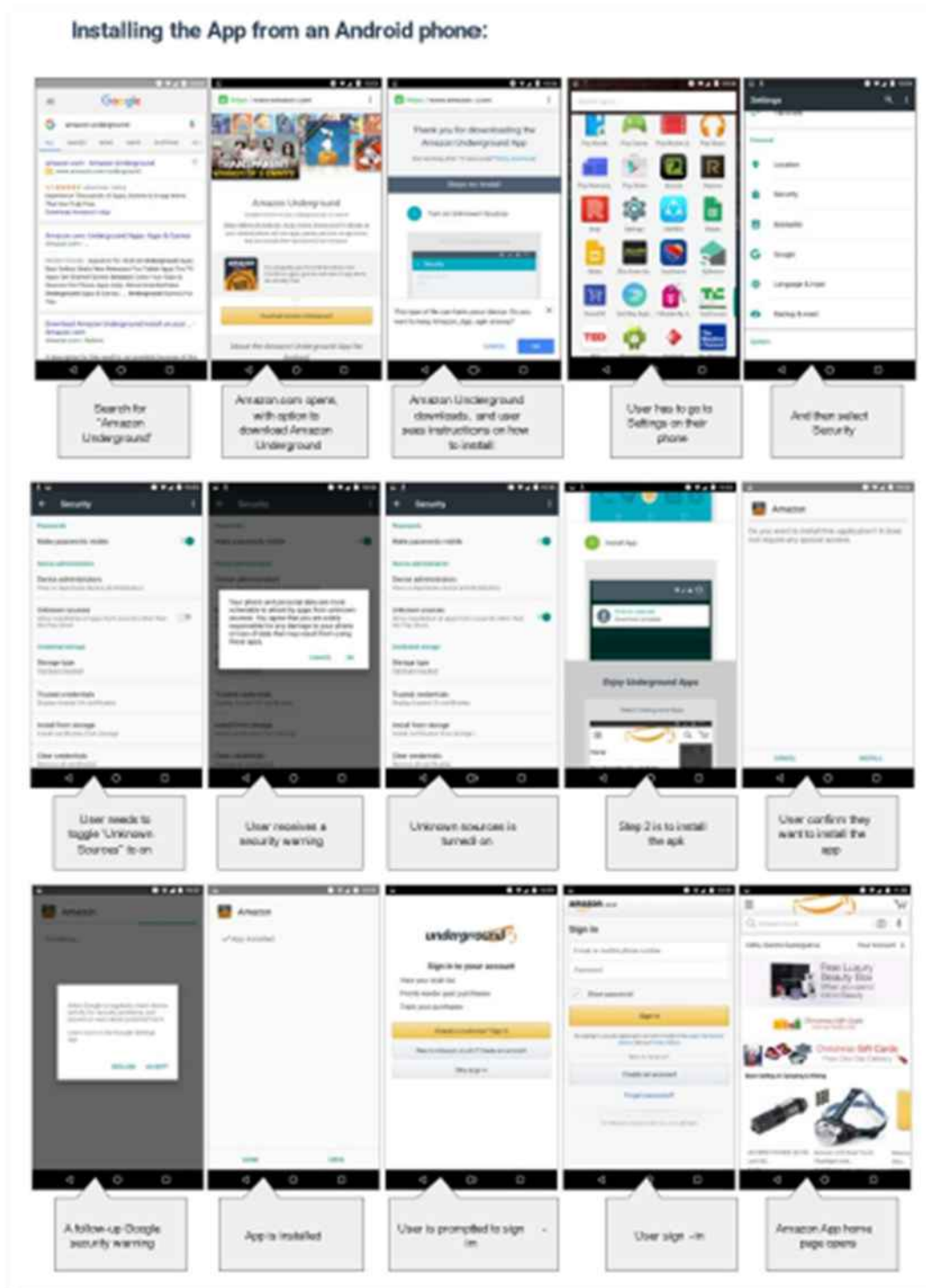
<sup>76</sup> Epic Games, “Play Fortnite on Android,” available at <https://www.epicgames.com/fortnite/en-US/mobile/android/>. *See also* F-Droid, “Packages,” available at <https://www.f-droid.org/en/packages/>.

<sup>77</sup> Google, “Amazon Underground User Experience,” November 2015, GOOG-PLAY-000575018.R-038.R, at 021.R (“User needs to toggle ‘Unknown Sources’ to on”); Google, “Amazon Top Partner Review,” March 17, 2016, GOOG-PLAY-004494298.R-325.R, at 318.R-321.R; Samat (Google) Deposition, pp. 178-185; and Hoff, John, “How To: Sideload Apps on Your Android Device,” *Android Community*, April 17, 2018, available at <https://androidcommunity.com/how-to-sideload-apps-on-your-android-device-20180417/>.



## Exhibit 7

### Sideloading the Amazon Underground App on Android (2015)



Source: Google, "Amazon Underground User Experience," November 2015, GOOG-PLAY-000575018.R-038.R, at 020.R-022.R.

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52. Google documents indicate that sideloading is limited. For example, Google data indicates that around [REDACTED] of apps on active Android smart mobile devices were “downloaded by a user from non-Play sources, including from direct downloading and third-party app stores” from February 2019 to December 2020.<sup>78</sup>

#### **D. In-App Billing Services**

53. After downloading applications, many apps provide consumers the option of purchasing extra digital content within the app, *e.g.*, to upgrade the user experience or unlock additional features.<sup>79</sup> For the remainder of this report, I use “in-app purchase” to mean purchasing digital content from within the app where the content is used and without the user exiting the “mobile app environment.”<sup>80</sup> The revenue generated from in-app purchases far surpasses the revenue from purchases of paid app downloads. For example, Google’s monthly app revenue data for U.S. transactions indicates that paid app downloads account for only [REDACTED] of total app revenues for the years 2019-2021, while subscriptions and in-app content purchases account for

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<sup>78</sup> Google, “Apps by Source,” April 26, 2021, GOOG-PLAY-001508603 (data as of December 1, 2020). These data reflect the monthly “cumulative number of apps on devices that... pinged the Play store in the past 28 days.” With these data, Google calculates a “% sideloaded app” of [REDACTED] over the 2019 and 2020; however, this higher share mainly includes “[a]pps that are pre-installed on the user’s device that do not update through Play.” In terms of how Google has measured / captured this data, *See* Cunningham (Google) Deposition, pp. 442-443 (“Q. ...How does Google – or to back up, what system does Google use to determine the cumulative number of apps available on these devices? A. ...But as far as the produced data is concerned, my understanding is that when we talk about the number of apps, this reflects a count of how many instances there were of apps that were seen to be installed on the devices in question. Q. And that’s the number of apps installed on the device at the time of the scan used to create this data? A. That’s correct. That is my understanding, that the count is made up of the apps that are present on the device and reported as part of that Play Protect scan.”). *See also* Cunningham (Google) Deposition, p. 438 (“Q. So if I’m understanding your testimony correctly, effectively this dataset is devices that have had Google Play Protect enabled in the past 28 days; is that right? A. Yes, my understanding is that the information reflected here, the devices in the scope of these –of the data that results from the auto-scan requests, the Play Protect scans, referred to as these pings, are devices that within the past 28 days from whatever date in question has information recorded would have had a scan performed and that network request successfully made in that 28-day period”). I also understand that this data is worldwide excluding China: “With respect to GOOG-PLAY-001508603, we confirm this data is worldwide excluding China.” *See also* Letter from Benjamin G. Bradshaw, O’Melveny, to John D. Byars, Bartlit Beck, April 29, 2022.

<sup>79</sup> *See* Google, “Make in-app purchases in Android apps,” available at <https://support.google.com/googleplay/answer/1061913?hl=en>. In-app payments occur in both free and paid apps (on top of the initial payment to download the app). *See* Adjust, “What is an in-app purchase?” available at <https://www.adjust.com/glossary/in-app-purchase/>.

<sup>80</sup> Cramer (Google) Deposition, p. 426 (“Q. And IAPs here means in-app purchases, right? A. Right. Yes.”).



approximately [REDACTED] and [REDACTED] respectively.<sup>81</sup> In 2020, worldwide consumer spending on in-app purchases, subscriptions, and paid apps in the Google Play Store reached [REDACTED].<sup>82</sup> Gross consumer spending in app stores across all platforms reached \$170 billion in 2021, with more than 230 apps and games surpassing \$100M in annual consumer spending and 13 of them surpassing \$1 billion.<sup>83</sup>

54. To complete in-app purchases, mobile apps use in-app billing services to verify a consumer's payment card information and release the digital content to the end-user upon payment confirmation.<sup>84</sup> Providers of in-app billing services may (or may not) also offer additional functions, such as invoicing, payment history, and refund processing.<sup>85</sup> In-app billing services are software solutions (coded in software development kits ("SDKs") or APIs) that enable users to purchase

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<sup>81</sup> See Rysman Workpapers.

<sup>82</sup> Chan, Stephanie, "Global Consumer Spending in Mobile Apps Reached a Record \$111 Billion in 2020, Up 30% from 2019," *Sensor Tower*, January 2021, available at <https://sensortower.com/blog/app-revenue-and-downloads-2020>. Assuming the amount of spending by purchase type for worldwide consumer spending is the same as app revenue breakdown for the U.S., worldwide consumer spending for in-app purchases, subscriptions, and paid apps were [REDACTED]. See Rysman Workpapers.

<sup>83</sup> Data.ai, "State of Mobile 2022," available at <https://www.data.ai/en/go/state-of-mobile-2022> (Note that global consumer spending includes those on iOS, Google Play, and third-party Android stores in China).

<sup>84</sup> Dubrova, Daria, "How to integrate payment systems into the existing app," *The App Solutions*, available at <https://theappsolutions.com/blog/development/payment-systems-for-the-app/>.

<sup>85</sup> For example, Amazon's In-App Purchasing API performs the following workflow: "logic to display the purchasable item," "perform the purchase," "handle any preconditions or error scenarios." It does not offer refunds on purchases of in-app items or track consumers' purchases. See Amazon Appstore, "In-App Purchasing Overview," February 25, 2022, available at <https://developer.amazon.com/docs/in-app-purchasing/iap-overview.html>. See also First Amended Complaint, ¶ 169.

digital content within an app.<sup>86,87</sup> In-app billing services generally include receiving payment and authorizing the unlocking of the purchased in-app content.<sup>88</sup> A payment gateway works as a virtual terminal at checkout to encrypt credit card information / payment credentials from the customer and pass them to payment processors, which then pass a consumer's payment data to an issuing bank, collect funds from the card-issuing bank, and transfer the funds to the merchant's account after deducting a fee.<sup>89</sup> Seamless in-app billing services are part of the user experience as they enable consumers to complete payments securely and swiftly without leaving the app, which leads to higher conversion of completed purchases within an app.<sup>90</sup>

55. Depending on the type of in-app purchase, developers can use third-party independent billing service providers, develop their own billing service within their apps, or use Google Play Billing or other app store billing services to complete in-app purchases on Android

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<sup>86</sup> For example, "Samsung In-App Purchase (IAP) is a payment service that makes it possible to sell a variety of items in applications for Samsung Galaxy Store and internally manages communication with supporting IAP services in the Samsung ecosystem, such as Samsung Account, Samsung Checkout, and Samsung Rewards. In-App Purchase can be used either to make a one-off payment or to pay for a regular subscription. Items that can be sold through In-App Purchase include premium content, virtual goods such as in-game items, and specific services with different length license terms." Samsung IAP also offers SDK and server APIs that allow the developer to "easily integrate IAP functionality into your app, such as configuring IAP, getting item details, offering and selling items, and managing purchased items" and "communicate with IAP server to verify item purchases, create a service token, and check subscription status." See Samsung, "What is Samsung In-App Purchase?" available at <https://developer.samsung.com/iap/overview.html>.

<sup>87</sup> For example, Amazon explains their In-App API functionality as follows: "The In-App Purchasing (IAP) API allows your app to present, process, and fulfill purchases of digital content and subscriptions within your app ... With In-App Purchasing (IAP), your app's users can purchase various types of digital items within your app, such as extra lives for a game or a subscription to premium content." See Amazon Appstore, "In-App Purchasing Overview," May 18, 2022, available at <https://developer.amazon.com/docs/in-app-purchasing/iap-overview.html>.

<sup>88</sup> Xsolla, for example, is an online payment gateway that connects to credit cards networks (e.g., Visa), integrated billing service providers (e.g., PayPal), and payment systems (e.g., Apple Pay and Google Pay). See Xsolla, "Pay Station," available at <https://xsolla.com/products/paystation> and Xsolla, "Grant Purchases to User," August 22, 2022, available at <https://developers.xsolla.com/solutions/web-shop/catalog-and-items/grant-purchases/>. As another example, Zuora is a payment processor specializing in subscription billing services. See Zuora, "Billing Software," available at <https://www.zuora.com/products/billing-software/>.

<sup>89</sup> See, e.g., Dublino, Jennier, "Payment Gateway vs. Payment Processor," *business.com*, September 20, 2022, available at <https://www.business.com/articles/payment-gateway-vs-payment-processor/>.

<sup>90</sup> Chu (Meta Platforms (formerly Google)) Deposition, p. 259 ("Q. From an engineering perspective why did you want to remove friction on the YouTube commerce platform? A. The work that we did was in the form of, for example, reduce the number of clicks. From the moment the user wants to buy something what can we do to reduce number of clicks and make it easier for them to purchase something. Reason for that is obvious that the more friction there is the more likely we lose users along the buy flow").

smart mobile devices.<sup>91</sup> Google has different rules for purchases of physical goods (*e.g.*, housewares, clothing, electronics) and services (*e.g.*, food delivery, transportation services, event tickets) than it has for ‘digital’ content; while Google requires use of Google Play Billing for in-app purchases, Google forbids using Google Play Billing for the purchase of physical goods or services, credit card and utility payments, peer-to-peer payments, or gambling.<sup>92</sup> Digital content includes subscription services, access to ad-free or premium content, game currencies or equipment, and cloud storage services.<sup>93</sup> Unlike for digital content, there are many major third-party providers of billing services for physical goods and services purchased on Android smart mobile devices, including, for example, PayPal, Adyen, Braintree, and Stripe.<sup>94,95</sup> In contrast to Google’s historical 30% rate to developers, these billing service providers charge a rate at or below 2.99% plus 49 cents per transaction, as shown in Exhibit 8.<sup>96</sup>

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<sup>91</sup> See, *e.g.*, Perez, Sarah, “Google Play to pilot third-party billing option, starting with Spotify,” TechCrunch, March 23, 2022, available at <https://techcrunch.com/2022/03/23/google-play-to-pilot-third-party-billing-option-globally-starting-with-spotify/>; Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738?hl=en>; and Stripe, “Stripe Android SDK,” Github, available at <https://github.com/stripe/stripe-android>.

<sup>92</sup> See Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738?hl=en>.

<sup>93</sup> See Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738?hl=en>. See, *e.g.*, Google, “Make in-app purchases in Android apps,” available at <https://support.google.com/googleplay/answer/1061913>. See also Apple, “Buy additional app features with in-app purchases and subscriptions,” December 17, 2021, available at <https://support.apple.com/en-us/HT202023>.

<sup>94</sup> See, *e.g.*, PayPal Editorial Team, “Payments Processing 101: Learn how your money gets to you,” *Paypal*, September 10, 2019, available at <https://www.paypal.com/uk/brc/article/how-online-payments-processing-works>.

<sup>95</sup> Additionally, developers may have coded/integrated payment processors or payment gateways such as Xsolla or Nets directly into the app. See Xsolla, “Find Ways to Grow with Xsolla Business Engine,” available at <https://xsolla.com/solutions>. See Nets, “Nets is part of Nexi Group – the European PayTech,” available at <https://www.nets.eu/who-we-are>. See, for example, a list of notable online billing service providers: Craig, William, “9+ Excellent Online Payment Systems,” *Webfx*, March 2, 2022, available at <https://www.webfx.com/blog/web-design/online-payment-systems/>.

<sup>96</sup> See also Dubrova, Daria, “How to integrate payment systems into the existing app,” *The App Solutions*, available at <https://theappsolutions.com/blog/development/payment-systems-for-the-app/>.

**Exhibit 8**  
**Select Alternative Billing Service Providers and Payment Methods<sup>97</sup>**

Transaction Service Provider	Transaction Commission	Example Marketplaces
Adyen	2.00% + \$0.12 per transaction	Uber, Ebay, and Booking.com
Braintree	2.59% + \$0.49 per transaction	StubHub, Airbnb, and GrubHub
PayPal	2.99% + \$0.49 per transaction	Etsy
Stripe	2.90% + \$0.30 per transaction	Lyft, Postmates, and Kickstarter

*Notes:*

1. Commissions reflect U.S. card transactions. The fees can fluctuate depending on the payment method and region.
2. Braintree is a subsidiary of PayPal.
3. Adyen transaction fee reflects Mastercard and Visa networks.
4. Information current as of September 29, 2022.

56. As described in Section IV.A.5 below, Google inserts its own billing services into the purchase flows of digital in-app content for apps downloaded through the Google Play Store and mandates the processing of payments through Google Play Billing before an item is delivered.<sup>98</sup>

57. Developers, in theory, can also build their own billing services within their apps (rather than using a third-party solution). For example, Spotify and Google recently announced the User Choice Billing program that will allow users to choose whether to use Spotify's own billing system and Google Play Billing, presented with those options side-by-side.<sup>99</sup> While Spotify's payments for purchases transacted through the Google Play Store are processed through Google Play Billing, to handle their complex payment subscriptions, Spotify's software engineers use a

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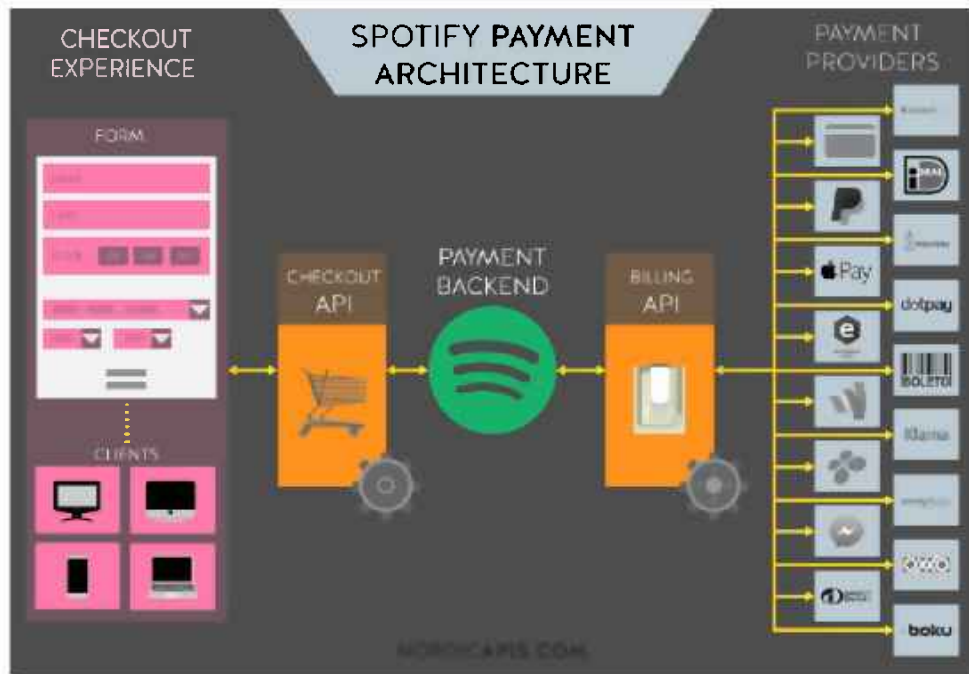
<sup>97</sup> Adyen, "Pricing," available at <https://www.adyen.com/pricing>; Braintree, "Pricing," available at <https://www.braintreepayments.com/braintree-pricing>; PayPal, "PayPal Merchant Fees," September 19, 2022, available at <https://www.paypal.com/us/webapps/mpp/merchant-fees>; Stripe, "Pricing built for businesses of all sizes," available at <https://stripe.com/pricing#pricing-details>; Adyen, "Our customers," <https://www.adyen.com/customers>; Braintree, "Braintree Merchants," available at <https://www.braintreepayments.com/learn/braintree-merchants>; Etsy, "Etsy Payments Policy," June 6, 2022, available at <https://www.etsy.com/legal/etsy-payments/>; and Stripe, "Customers," available at <https://stripe.com/customers>.

<sup>98</sup> Google, "Purchase flow," July 15, 2021, available at [https://developers.google.com/standard-payments/concepts/tokenized\\_fop/purchase-flow](https://developers.google.com/standard-payments/concepts/tokenized_fop/purchase-flow).

<sup>99</sup> Samat, Sameer, "Exploring User Choice Billing With First Innovation Partner Spotify," *Android Developers Blog*, March 23, 2022, available at <https://android-developers.googleblog.com/2022/03/user-choice-billing.html>. See also Perez, Sarah, "Google Play to pilot third-party billing option, starting with Spotify," *TechCrunch*, March 23, 2022, available at <https://techcrunch.com/2022/03/23/google-play-to-pilot-third-party-billing-option-globally-starting-with-spotify/>.

private API for its own billing system: “[the] Checkout API to help build flows that make it easy for users to enter payment details, and the Billing API to interface with the various details of Payment Providers and Credit Networks, enabling the Payment Backend to determine if they can charge a user for a subscription with a single call.”<sup>100</sup> Spotify’s bespoke solution is depicted in Exhibit 9 below.

**Exhibit 9**  
**Spotify Payment Architecture**



*Source:* Doerrfeld, Bill, “The Brilliance of Spotify Internal APIs to Mitigate Payments,” *Nordic APIs*, November 8, 2016, available at <https://nordicapis.com/the-brilliance-of-spotify-internal-apis-to-mitigate-payments/>.

58. However, in most instances, as described in Section VIII below, Google’s rules prevent developers from leading users to their proprietary billing services within their apps. Thus, even if developers want to develop their own billing services, they are unable to inform Android

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<sup>100</sup> See Doerrfeld, Bill, “The Brilliance of Spotify Internal APIs to Mitigate Payments,” *Nordic APIs*, November 8, 2016, available at <https://nordicapis.com/the-brilliance-of-spotify-internal-apis-to-mitigate-payments/>.

users who downloaded their app through the Google Play Store that this alternative billing solution is available.

#### IV. Google Agreements and the Challenged Conduct

##### A. Google Background

###### 1. *Development of the Android Mobile OS*

59. Android, Inc. was developed in October 2004 to create an open-source operating system for cameras.<sup>101</sup> Co-founder Andy Rubin had built a mobile device OS at his prior venture, Danger. Danger had T-Mobile as an MNO partner, and together they launched the Sidekick phone.<sup>102</sup> But the product did not successfully scale; T-Mobile “never reached the market share that we were hoping to with Danger,”<sup>103</sup> and Mr. Rubin testified that “it was a challenge attracting third-party developers[,]” OEMs, and MNOs to use Danger’s mobile OS.<sup>104</sup>

60. “[P]ersonally frustrated,”<sup>105</sup> Mr. Rubin turned his attention to cameras, before getting a call from Nick Sears—a former T-Mobile employee who served as the network’s marketing counterpart to Danger on the Sidekick<sup>106</sup>—in October of 2004. Sears pitched Rubin on creating a better smartphone experience instead, and by the end of 2004, Android became a mobile OS

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<sup>101</sup> Rubin (formerly Google) Deposition, pp. 24-25 (“Q. What prompted you to develop Android in 2004? A. [...] So I set out to build another platform. Initially, I focused that platform on digital cameras [...] so originally I set out to create a robust platform for digital cameras that then turned into Android.”); Sears (Google) Deposition, p. 29 (“Q. So can you tell us about his reaction and those conversations? A. He told me he was working on an open source operating system that he planned to use for cameras.”). *See also* Elgin, Ben, “Google Buys Android for Its Mobile Arsenal,” *Business Week*, August 17, 2005, available at <https://www.tech-insider.org/mobile/research/2005/0817.html>.

<sup>102</sup> Sears (Google) Deposition, pp. 24-25 (“Q. And what was the Sidekick? A. That was our version of their product.”).

<sup>103</sup> Sears (Google) Deposition, p. 25.

<sup>104</sup> Rubin (formerly Google) Deposition, p. 24.

<sup>105</sup> Rubin (formerly Google) Deposition, p. 24.

<sup>106</sup> Rubin (formerly Google) Deposition, pp. 26 -27 (“Nick Sears was . . . a former product marketing person for T-Mobile. He actually helped us at Danger. He was the – he was the counterpart in marketing in T-Mobile when Danger launched, so we brought him on and he was focused on kind of product positioning, you know, go-to-market, you know, strategy and things like that and obviously [was] quite good at his job.”).



project.<sup>107</sup> Rubin’s co-founders on the project were Nick Sears, Chris White, and Rich Miner.<sup>108</sup> By December 2004, Android adopted a formal business strategy with the goal to enable carriers “to put *one* operating system across *all* the manufacturing devices” instead of offering their own competing OSs.<sup>109</sup> To accomplish this, the Android OS would be available open source, but according to Sears, Android was “planning to monetize that” by “sell[ing] carriers value-added services” on top of the OS.<sup>110</sup> And Rubin testified that “part of the original strategy” for Android in 2004 was to offer an app store for developers “to sell their product” to Android users.<sup>111</sup>

61. Soon after, in January 2005, Google co-founders Larry Page and Sergey Brin met with Android co-founders Andy Rubin and Nick Sears to discuss a possible acquisition of Android

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<sup>107</sup> Sears (Google) Deposition, p. 28; Sears (Google) Deposition, pp. 184-185 (“Q. Sorry. And how did its business direction change in October of 2004? A. When I talked to Andy in October of 2004, he was planning on doing an open source platform for cameras and then – and I told him that I could not add any value to cameras, but if he decided to do phones to call me back, and I got a call about a month or so later than he was going to change the direction of the company and do an open source platform for phones.”).

<sup>108</sup> Rubin (formerly Google) Deposition, p. 26 (“Q. You mentioned co-founders. Who were your co-founders at Android? A. Chris White, Rich Miner, and Nick Sears.”); Google, “Key Themes,” GOOG-PLAY-001135055-086, at 057 (“October, 2003: Android is founded in Palo Alto, CA by Andy Rubin, Rich Miner, [later] Nick Sears, and Chris White”); Sears (Google) Deposition, p. 184 (“Q. I think we saw a timeline earlier today that mentioned you as one of the founders of Android. Is that a true characterization? A. Android post October, yeah. I mean you saw in that timeline that Android was founded before that, but its business direction changed in sometime after October. And so I would have been considered a founder for – for that point on, for that purpose.”).

<sup>109</sup> Sears (Google) Deposition, p. 186 (“Q. Yes. Have you devised a business strategy for Android once you joined it? A. [ . . . ] Yes, so this is all pre-Google but yes, we – we came up with a business strategy in December of 2004. Q. And what was the business strategy for Android before Google came onto the scene? A. It was the same overall approach which was to do an open source platform that would allow carriers to put one operating system across all the manufacturing devices. I refer [to] that as a horizontal platform for carrier friendly.”).

<sup>110</sup> Sears (Google) Deposition, p. 186 (“Q. And what was the business strategy for Android before Google came onto the scene? A. It was the same overall approach which was to do an open source platform that would allow carriers to put one operating system across all the manufacturing devices [ . . . ] And the way that we were planning to monetize that was that we would then develop and sell carriers value-added services that would help them be more efficient in running their business. And we had different ideas of the kinds of apps that we could run on this platform [ . . . ]”); and Roth, Daniel, “Google’s Open Source Android OS Will Free the Wireless Web,” *Wired*, June 23, 2008, available at <https://www.wired.com/2008/06/ff-android/>, (“Rubin said his startup, called Android, had the solution: a free, open source mobile platform [ . . . ] He would make his money by selling support for the system—security services, say, or email management.”).

<sup>111</sup> Rubin (formerly Google) Deposition, pp. 48-49 (“Q. So you knew essentially since 2004 that you will want a store that would operate on the Android OS, right? A. Yeah. . . . and obviously we want to create a business opportunity for developers, so we want them to be able to sell their product and giving them a place to sell their product, a storefront, was part of the original strategy.”).

by Google.<sup>112</sup> Page called the Sidekick—which set Google Search as the default search engine<sup>113</sup>—“the best phone experience that had been created for a data device.”<sup>114</sup> Rubin recognized a common business strategy, explaining that “Google’s model is to build a killer app, then monetize it later.”<sup>115</sup> In July 2005, Google bought Android, Inc.<sup>116</sup>

62. Android debuted on its first commercial mobile device, the HTC Dream, in September 2008 on the T-Mobile network, where it was alternatively branded the G1.<sup>117</sup> As explained in greater detail below in Section IV.B.5, Google and T-Mobile entered into a series of agreements accompanying the launch of the G1.

## 2. *Android Mobile OS at Release*

63. Google announced Android to the public in 2008.<sup>118</sup> The Android mobile OS was built on the Linux kernel, part of an existing OS.<sup>119</sup> Android originally included a suite of free and

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<sup>112</sup> Sears (Google) Deposition, pp. 32-33.

<sup>113</sup> Roth (2008) (“But Rubin, a well-known Silicon Valley player, chose Google as the Sidekick’s default search engine. Page was flattered by the unexpected endorsement.”).

<sup>114</sup> Sears (Google) Deposition, p. 33 (“Q. And what did they express as the reason for Google’s interest in acquiring Android? A. Larry Page thought that the – told us that he thought that the Sidekick was the best phone experience that had been created for a data device and he wanted to – he wanted to also make a better phone experience for customers.”).

<sup>115</sup> Roth, Daniel, “Google’s Open Source Android OS Will Free the Wireless Web,” *Wired*, June 23, 2008.

<sup>116</sup> Rubin (formerly Google) Deposition, p. 28 (“Q. When did Android sell itself to Google? A. July 2005”); Google, “Key Themes,” GOOG-PLAY-001135055-086, at 057 (“July, 2005: Android is acquired by Google, Inc.”); Google, “Google’s Next Revolution,” GOOG-PLAY-001422296-304 at 301 (“Google acquired Android at an undisclosed amount in 2005”); Manjoo, Farhad “A Murky Road Ahead for Android, Despite Market Dominance,” *N.Y. Times*, May 27, 2015, available at <https://www.nytimes.com/2015/05/28/technology/personaltech/a-murky-road-ahead-for-android-despite-market-dominance.html> (“Android reportedly cost at least \$50 million”).

<sup>117</sup> Rubin (formerly Google) Deposition, p. 57 (“So the first phone was called the Dream. We launched it on T-Mobile and it was effectively our reference design”); Cragg, Oliver, “Remembering the first Android phone, the T-Mobile G1 (HTC Dream),” *Android Authority*, September 24, 2021, available at <https://www.androidauthority.com/first-android-phone-t-mobile-g1-htc-dream-906362> (“But that relationship started with the first Android phone, launched on September 23, 2008, the HTC Dream. Just under a month later, the same phone went on sale in the US on October 22 for a price of \$179 called the T-Mobile G1.”).

<sup>118</sup> See Open Handset Alliance, “Google and the Open Handset Alliance Announce Android Open Source Availability,” October 21, 2008, available at [http://www.openhandsetalliance.com/press\\_102108.html](http://www.openhandsetalliance.com/press_102108.html).

<sup>119</sup> Google, “Android Anatomy and Physiology,” GOOG-PLAY-010100574-693, at 578 (“Android is built on the Linux kernel, but Android is not Linux” (emphasis in original)); Callaham, John, “The history of Android: The evolution of the biggest mobile OS in the world,” *Android Authority*, August 13, 2022, available at <https://www.androidauthority.com/history-android-os-name-789433/>.



open-source apps, including an instant messaging app, browser, camera, calculator, contact list, calendar, email app, clock, and a media player.<sup>120</sup> In contrast to Apple's iOS, open-source Android is not, upon release, proprietary to Google. The Android source code is available for use for free under the terms of the Apache License (discussed in Section IV.B.1 below), and anyone may download it from Google's website.<sup>121</sup> OEMs can access Android's underlying source code and create their own version of Android for their smartphones and tablets (sometimes referred to as an Android "fork").<sup>122</sup> At the time of Android's release, Google marketed it to partners as a platform that would be "freely available as open source software" that "is not intended to directly generate any revenue for Google."<sup>123</sup>

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<sup>120</sup> Google, "Android Anatomy and Physiology," GOOG-PLAY-010100574-693, at 576; Google, "2008 Google I/O Session Videos and Slides: Anatomy & Physiology of an Android." available at <https://sites.google.com/site/io/anatomy--physiology-of-an-android>; and Brady (Google) Deposition, p. 321 ("Q. And when open-source Android was initially released, there was a fully functioning open-source browser app available with the operating system. Right? A. That's correct.").

<sup>121</sup> See Android, "Android Open Source Project," available at <https://source.android.com>; Brady (Google) Deposition, pp. 42-43 ("Q. And what did you mean when you said Android is an open source mobile platform? A. I meant that Android was a mobile operating system that was provided as open source software to run on mobile phones. Q. And it was provided open source under the Apache license. Do you recall that? A. Primarily under the Apache license. There [are] a number of licenses for different components in the open source distribution. Q. Understanding that parts of the Linux [kernel] are licensed under something separate. Right? A. Correct. [. . .]"); Google, "Android Strategy and Partnerships Overview," June, 2009, GOOG-PLAY-008389054-089, at 062 ("Give it away for free, and aggressively build a developer ecosystem to drive innovation and platform adoption"); Rosenberg (Google) Deposition, p. 187 ("Q. And Google released Android under an open source license? A. Yes. Q. And part of software being open source is that it is free, right? A. Correct. Q. Google gave Android operating system away for free from the beginning? A. Yes."); Google, "CTS and GMS Overview," GOOG-PLAY-009295801-815, at 814 ("Apache License: Wild west / virtually uncontrolled.").

<sup>122</sup> See Google, "Android Agreements Explainer – ACC, MADA, RSA, DCB," February 2, 2018, GOOG-PLAY-001559464.R-496.R, at 468.R ("SoCs create their own forks of AOSP to meet their clients' needs (e.g., adding features AOSP doesn't have, like multi-SIM support). Some OEMs then create their own fork on top of this fork (e.g., adding their own apps, like Samsung's Bixby assistant). . . . So, virtually all Android devices are a fork of a fork of a fork of AOSP (fork^3)."). See also DeviceAtlas, "Android forks: Why Google can rest easy, for now," available at <https://deviceatlas.com/blog/android-forks-why-google-can-rest-easy-for-now> ("There are two kinds of Android forks – 'compatible' and 'non-compatible'.").

<sup>123</sup> Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Daniel Conrad, "Subject: Fwd: Android Strategy and Partnerships preso," June 12, 2009, GOOG-PLAY-008389051, and attachment "Android Strategy and Partnerships Overview," June 2009, GOOG-PLAY-008389054-089, at 062 ("Give it away for free, and aggressively build a developer ecosystem to drive innovation and platform adoption.") and 063.

### 3. *Google Mobile Services*

64. I understand that Google makes key application programming interfaces (“APIs”) that interact with the majority of top third-party Android apps, as well as Google-branded apps and services.<sup>124</sup> In addition to the Android OS, Google offers Google Mobile Services (“GMS”), which is composed of a suite of proprietary “Google applications and APIs that help support functionality across devices” (such as Gmail, YouTube, and Google Maps), available only to OEMs that execute separate license agreements with Google.<sup>125</sup> “826 out of the top 1000 Android apps”<sup>126</sup> call on GMS APIs to function, and, thus, OEMs have incentives to include GMS on smart mobile devices.<sup>127</sup> GMS “is available [to OEMs] only through a license with Google,” which requires pre-installation of the Google Play Store in a preferential location on the device home screen.<sup>128</sup> Unlike the

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<sup>124</sup> Rosenberg (Google) Deposition, pp. 189-190 (“Q. And Google Mobile Services refers to a core set of apps and APIs? A. Google Mobile Services is a set of Google apps and Google APIs that we distribute on Android compatible devices. Q. And developers write applications to particular APIs; is that right? A. They do. Those could – those could be APIs in open source, they could also be APIs that Google provides”).

<sup>125</sup> See, e.g., Android, “Google Mobile Services,” available at <https://www.android.com/gms/>; and Rosenberg (Google) Deposition, pp. 189-190 (“Q. And Google Mobile Services refers to a core set of apps and APIs? A. Google Mobile Services is a set of Google apps and Google APIs that we distribute on Android compatible devices. Q. And developers write applications to particular APIs; is that right? A. They do. Those could – those could be APIs in open source, they could also be APIs that Google provides”) and pp. 192-193 (“Q. Now, Google uses the MADA agreements, those are the mobile application distribution agreements, to get certain Google applications distributed across almost every smartphone running on Android, true? A. The MADA agreement is the agreement by which we license a collection of Google apps and other software to Android OEMs who choose to build devices with our software”); Kolotouros (Google) Deposition, pp. 60-61 (“Q. And ACC is the Android Compatibility Commitment? A. Yes.”) and p. 62 (“Q. Is it your understanding that an OEM cannot enter into a MADA unless it signs an AFA or ACC? A. Currently an ACC is required for a MADA to be entered into”).

<sup>126</sup> Android Global Business Team, “Android 101,” May 2019, GOOG-PLAY-000128863.R-908.R at 876.R ( “826 out of the top 1000 Android apps use 1 or more GMS Core APIs (Facebook, WhatsApp, Twitter, and many other apps”); and Kolotouros (Google) Deposition, p. 448 (“Q. So, understanding that many developers utilize -- elect to utilize Google Play services that APIs and utilities make their apps better, it's fair to say that according to this slide, 826 out of the top thousand Android apps used one or more GMS core APIs; is that correct? A. Yes, I see that on the slide, yes.”).

<sup>127</sup> Brady (Google) Deposition, p. 45 (“Q. Why did you believe that Android with GMS was a much more compelling product than just Android? A. [...] You know Google Search, Google Maps, YouTube, et cetera, were very popular products at the time. And so . . . users found them compelling. And our partners then wanted to distribute them.”); Email from Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, to Wirelessbiz, “Subject: [Wirelessbiz] Re: Android Deployments and Partner Inquiries,” October 13, 2008, GOOG-PLAY-008471716-720, at 717 (“Most partners don’t just want Android for Android; they want Android with GMS because this a much more compelling product.”).

<sup>128</sup> Android, “Android Compatibility Program Overview,” available at <https://source.android.com/docs/compatibility/overview>. See Exhibit 61.

Android OS, GMS is not open source, but is integrated at the system level, which enables developers to incorporate Google services such as Google Pay into their apps.<sup>129,130</sup> OEMs license Google Play as part of GMS through Mobile Application Distribution Agreements (“MADAs”). Google requires GMS licensees to pre-install the Google Play Store to access other GMS apps under its MADAs.<sup>131</sup>

65. As explained in greater detail in Section IV.B.4 below, the MADAs generally require that an OEM preload all GMS apps on their smart mobile devices as a condition to preloading any GMS apps.<sup>132</sup> Over time, these GMS apps came to supersede analogous functions from Android

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<sup>129</sup> Wankhede, Calvin, “What are Google Mobile Services (GMS)?,” *Android Authority*, March 3, 2022, available at <https://www.androidauthority.com/google-mobile-services-gms-3025963/>.

<sup>130</sup> As discussed in paragraph 76, Google Pay is different from in-app billing services like Google Play Billing but is instead a payment system that allows consumers to store their credit card information in the “digital wallet” on their mobile device and make purchases or send money with their smartphones.

<sup>131</sup> For example, in a copy of MADA signed by Samsung, under § 2.1. License Grant, it stated that “[d]evices may only be distributed if all Google Applications (excluding any Optional Google Applications) authorized for distribution in the applicable Territory are pre-installed on the Device[.]” See Google, “Mobile Application Distribution Agreement (Android),” June 17, 2014, GOOG-PLAY-000449883-897, at 885. See also Brady (Google) Deposition, p. 44 (“Q. And Google Mobile Services and these apps were what Google was licensing to OEMs under the MADA. Correct? A. That is correct.”), P. 98 (“Q. And GMS here is a reference to Google Mobile Services? A. That’s correct. Q. And those are the apps that are licensed under the MADA. Right? A. That’s correct.”), and pp. 190-191 (“Q. And an OEM had to sign an anti-fragmentation agreement with Google as a condition to being able to be a licensee of Google Mobile Services, including Android Market and the Play Store. Right? A. That’s correct.”); and Rosenberg (Google) Deposition, pp. 192-193 (“Q. Now, Google uses the MADA agreements, those are the mobile application distribution agreements, to get certain Google applications distributed across almost every smartphone running on Android, true? A. The MADA agreement is the agreement by which we license a collection of Google apps and other software to Android OEMs who choose to build devices with our software.”).

<sup>132</sup> Google, “CTS and GMS Overview,” GOOG-PLAY-009295801-815, at 810 (“Mandatory apps are an integrated suite, partners can’t cherry-pick”); Brady (Google) Deposition, pp. 201-202 (“Q. And what that means in practice is that an OEM that signs a MADA has no obligation to actually distribute the Google apps licensed under the MADA, but if they distribute any, they must take and distribute all the mandatory ones. Is that right? A. That is correct. With caveats around geographic availability and things like that. But generally yes”); Li (Google) Deposition, p. 194 (“Q. If an OEM would like to pre-install any of the required apps on a device under the terms of the MADA, that OEM must pre-install all of the required apps on that device; correct? A. Yes”); Email from Yeum Doug, Google, to Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, “Subject: Re: quick question on Market,” April 27, 2010, GOOG-PLAY4-000341393-394 at 393 (“Do you know if our Android team is ever planning to unbundle the apps in GMS and allow partners to pick and choose what Google apps to preload on their devices? [ . . . ] Right now it’s all or nothing”).

Open Source Project (“AOSP”) or open-source version of Android<sup>133</sup> that Google sunset or stopped updating, as explained below in Section VII.A.

#### 4. *The Google Play Store*

66. The Google Play Store is, according to Google, “a platform that app developers can use to distribute apps, and consumers can use to discover and install apps, on devices running the Android OS.”<sup>134</sup> Google Play sells not only apps, but also other digital content like movies, TV shows, and books.<sup>135</sup>

67. The predecessor to the Play Store was “Android Market,” which Google launched in October of 2008 with the early Android smart mobile devices, such as the T-Mobile G1.<sup>136</sup> Android Market was not a content reseller; rather, Android Market was “a marketplace that would

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<sup>133</sup> AOSP refers to the “Android Open Source Project,” and I understand from Google testimony and documents that it is used as a shorthand for the open-source release of Android. *See* Brady (Google) Deposition, p. 292 (“What is the Android Open Source Project? A. The Android Open Source Project, sometimes referred to under the acronym AOSP, is the open source distribution compatible of Android as made available at source.android.com. It kind of refers to the distribution, the actual software itself, as well as the tools and services around it that allow people to contribute code and review code together, and download the code and things like that.”).

<sup>134</sup> “Google’s Responses and Objections to Epic’s Second Set of Interrogatories,” *Epic Games Inc. v Google LLC et al.*, United States District Court Northern District of California San Francisco Division, Case No. 3:20-cv-05671-JD and Case No. 3:21-md-02981-JD, August 19, 2021.

<sup>135</sup> “Google’s Responses and Objections to Epic’s Second Set of Interrogatories,” *Epic Games Inc. v Google LLC et al.*, United States District Court Northern District of California San Francisco Division, Case No. 3:20-cv-05671-JD and Case No. 3:21-md-02981-JD, August 19, 2021 (explaining that Google Play is “a platform that app developers can use to distribute apps, and consumers can use to discover and install apps, on devices running the Android OS.”); and Google Play, “How Google Play works,” available at <https://play.google.com/about/howplayworks/> (explaining that “people go to find their favorite apps, games, movies, TV shows, books, and more.”).

<sup>136</sup> Rubin (formerly Google) Deposition, p. 58 (“Q. [ . . . ] In October of 2008 you announced the opening of what became known as the Android Market, right? A. Yes. That was the original name of the app store. The Play Store is what they call it today.”); Brady (Google) Deposition p. 35 (“Q. And what is or was Android Market? A. Android Market was a digital marketplace for distributing Android applications developed by third-party developers, as well as some from Google and our partners. Distributing those to Android devices or Android users”); EC Google Android Decision, ¶ 123; German, Kent, “A brief history of Android phones,” *CNET*, August 2, 2011, available at <http://www.cnet.com/news/a-brief-history-of-android-phones/>.

enable transactions between third parties[:] app developers, and consumers.”<sup>137</sup> From the outset, Google represented Android Market to be (a) an open ecosystem that (b) Google operated “revenue-neutral” on behalf of the ecosystem of developers, consumers, OEMs, and carriers interacting with Android OS.<sup>138</sup> Google explained that its use of the word “market” instead of “store” was intentional to highlight its openness to developers for distributing their content to consumers: “We chose the term ‘market’ rather than ‘store’ because we feel that developers should have an open and unobstructed environment to make their content available.”<sup>139</sup>

68. While Google represented that it would operate Android Market without “mak[ing] money,” Android leadership also saw Android Market as a distribution method for Google’s proprietary applications.<sup>140</sup> Google also sold Android smart mobile devices through

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<sup>137</sup> Brady (Google) Deposition, pp. 150-151 (“At this point, Android Market was set up as a marketplace. Meaning, Google was not the merchant of record. We were not selling apps to consumers. We were a marketplace that would enable transactions between third parties, app developers, and consumers. And so while we provided a transaction service and took a transaction fee, that was then passed on to the carrier that, you know, or the credit company or both. We were not reselling the content.”); Google, “Android Strategy and Partnerships Overview,” June 2009, GOOG-PLAY-008389054-089, at 085 (“Google is not a reseller[:] We’re relying on DMCA to protect us against copyright issues, etc. with an unfiltered application market. If we become a reseller and start taking revenue share, it becomes legally difficult to hide behind DMCA”).

<sup>138</sup> Email from Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, to Mark Vandenbrink, Vice President of Technology Solutions at Samsung Telecommunications America, “Subject: RE: Yet Another Question,” November 5, 2009, GOOG-PLAY-001501104-106, at 105 (“Google operates Android Market as a revenue-neutral service – we do not seek to profit off of application sales, and we invest in Market because it is essential to the open ecosystem”); Brady (Google) Deposition, pp. 456-457 (“Q. And so you, in this email, communicated to Samsung that Android Market was a revenue neutral service at the time. Correct? A. That is correct. That was communicating my understanding. Q. Do you recall communicating that to other OEMs? A. I think generally yes, we did communicate this to OEMs. I don’t recall specific instances with specific OEMs. But generally, we communicated that. Q. And do you recall communicating that to carriers? A. I think we probably communicated this to carriers as well”).

<sup>139</sup> Android Developers, “Android Market: a user-driven content distribution system,” August 28, 2008, available at <https://android-developers.googleblog.com/2008/08/android-market-user-driven-content.html>.

<sup>140</sup> Rubin (formerly Google) Deposition, p. 430 (“Q. You saw – you saw Android Market as a tool, in part, to solve this compatibility problem that developers potentially faced? No. [Objection.] A. I viewed Android Market as distribution for third-party developers, that’s horizontal, across OEMs and also distribution for Google’s own applications.”); Brady (Google) Deposition, p. 35 (“Q. And what is or was Android Market? A. Android Market was a digital marketplace for distributing Android applications developed by third-party developers, as well as some from Google and our partners. Distributing those to Android devices or Android users.”); and Email from Justin Mattson, Google, to Dan Morill, Google, and Eric Chu, Google, “Subject: Re: [android-advocates] Re: [android-vendingmachine] Re: Change in default revenue share,” December 17, 2009, GOOG-PLAY-004338990-993, at 990 (“We have previously said that we don’t make money from [Android] Market[.]”).

Android Market.<sup>141</sup> As for monetizing app and in-app content sales directly, Google noted in 2009 that it could not yet take a share of Android Market revenue for itself because it did not “have a dominant market position right now.”<sup>142</sup>

69. In 2011, Google started discussing rebranding Android Market under a code name called “Fi.” “Fi” would also sell content verticals including books, movies, TV shows, and music.<sup>143</sup> Patrick Brady, then-Director of Android Partner Engineering, warned that the contemplated rebrand would cause fragmentation in the Android ecosystem with Google’s partners: “Re-branding to ‘Fi’ positions it clearly as a Google product, and ‘just another app store for Android’, not \*the\* Android app store.”<sup>144</sup> Brady proposed separate stores for apps and content verticals.<sup>145</sup> Google’s “messaging” that it “operates Market revenue neutral and shares all revenue with developers and partners” would not “hold true” in a combined store that “operated revenue-positive, with no/reduced rev-share,” and partners could view Google as “pull[ing] a fast one.”<sup>146</sup>

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<sup>141</sup> Google, “Mobile Finance Org Chart,” GOOG-PLAY-003773053.R-065.R (showing hardware as part of the Google mobile finance group); Gold (Google) Deposition, pp. 34-35; Email from Cristina Bitu, Google, to Sundar Pichai, Google, June 2, 2013, GOOG-PLAY4-000038856-858, at 857; Gold (Google) Deposition, p. 161 (“Q. And the reference here to N7s being sold through Play, at one point in time Play was a point of sale for hardware as well; right? A. I vaguely remember that”).

<sup>142</sup> Google, “Android Strategy and Partnerships Overview,” June 2009, GOOG-PLAY-008389054-089, at 085.

<sup>143</sup> Brady (Google) Deposition, p. 266 (“Q. What was Fi? A. I don’t recall – today it is the name for Google’s mobile carrier service. Of [sic] I don’t think that’s what we were referring to at this time. I guess at one point there was a plan to remarket it – to rebrand Android Market as Fi, F-i”) and pp. 269-271.

<sup>144</sup> Email from Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, to Eric Chu, Engineering Director at Meta Platforms and formerly Director of the Android Developer Ecosystem at Google, “Subject: Fwd: Amazon Appstore is live,” March 24, 2011, GOOG-PLAY-005668770-771, at 770.

<sup>145</sup> Email from Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, to Eric Chu, Engineering Director at Meta Platforms and formerly Director of the Android Developer Ecosystem at Google, “Subject: Fwd: Amazon Appstore is live,” March 24, 2011, GOOG-PLAY-005668770-771, at 770; Brady (Google) Deposition, pp. 269-270 (“Q. You disagreed and thought that something that offered Google verticals, meaning music, books and the like for sale, ought to be in a separate store from Android Market, which offers apps. Right? A. That was my opinion, yes”); Brady (Google) Deposition, pp. 270-271.

<sup>146</sup> Email from Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google for Google, to Hugo Barra, Google, Shari Doherty, Google, Eric Chu, Engineering Director at Meta Platforms and formerly Director of the Android Developer Ecosystem at Google, Marc Vanlerberghe, Google, Michael Siliski, Google, Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, John Lagerling, Vice President of Business Development Mobile and Product Partnerships at Meta (formerly Facebook) and formerly Senior Director of Android Global Partnerships at Google, Jamie Rosenberg, Vice President of Strategy and Operations, Platforms and Ecosystems Division, at Google, Matias Duarte, Google, “Subject: Re: Market Rebranding #2,” April 26, 2011, GOOG-PLAY-006339980-982, at 980; Brady (Google) Deposition, pp. 290-291.



70. Ultimately, Google “consolidated all of the operating system’s content stores into [...] the Google Play Store,” which launched and replaced Android Market in March 2012.<sup>147</sup> With the launch of the Google Play Store, Google rebranded Google Music, Google Books, and Google Movies to Google Play Music, Google Play Books, and Google Play Movies, respectively, and made them available within the Google Play Store.<sup>148</sup>

71. By 2014, the Google Play Store became the “largest Google business outside of its advertising efforts.”<sup>149</sup> In 2015, the Google Play Store stopped selling hardware devices and focused on the download and purchase of digital content.<sup>150</sup>

72. More than 3.5 million apps were available on the Google Play Store as of the second quarter of 2022, making it the largest app store across all mobile operating systems in the world (excluding China where the Google Play Store is not permitted to operate due to Chinese government’s restrictions on Google’s commercial activities after 2010<sup>151</sup>).<sup>152</sup> The Google Play Store gained more than 1 billion monthly active users as early as 2015<sup>153</sup> and generated 111.3 billion app downloads in 2021.<sup>154</sup>

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<sup>147</sup> Callaham, John, “From Android Market to Google Play: a brief history of the Play Store,” *Android Authority*, March 6, 2017, available at <https://www.androidauthority.com/android-market-google-play-history-754989/> (hereafter “Callaham (2017)”). See Chu (Meta Platforms (formerly Google)) Deposition, p. 29 (“Q. And Android Market was, at some later point, rebranded as the Google Play Store, correct? A. That is correct.”).

<sup>148</sup> Rutnik, Mitja, “What was Android Market and how is Google Play different?,” *Android Authority*, December 4, 2017, available at <https://www.androidauthority.com/android-market-google-play-different-787082/>.

<sup>149</sup> Grush, Andrew, “Google Play is now Google’s biggest cash maker after advertising,” *Android Authority*, June 25, 2014, available at <https://www.androidauthority.com/google-play-biggest-cash-maker-397156/>.

<sup>150</sup> Callaham, John, “From Android Market to Google Play: a brief history of the Play Store,” *Android Authority*, March 6, 2017.

<sup>151</sup> See D’onfro, Jilian “Google is missing out on billions of dollars by not having an app store in China, new data shows,” *CNBC*, January 17, 2018, available at <https://www.cnbc.com/2018/01/17/google-misses-out-on-billions-in-china.html>.

<sup>152</sup> See, e.g., Statista, “Number of apps available in leading app stores as of 2<sup>nd</sup> quarter 2022,” August 11, 2022, available at <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>.

<sup>153</sup> See, e.g., Weber, Harrison, “Android passes 1.4B active devices as Google Play passes 1B active users,” *Venture Beat*, September 29, 2015, available at <https://venturebeat.com/2015/09/29/android-passes-1-4b-active-devices-google-play-passes-1b-active-users/>; and Dogtiev, Artyom, “App Stores List,” *Business of Apps*, May 4, 2022, available at <https://www.businessofapps.com/guide/app-stores-list/>.

<sup>154</sup> See, e.g., Statista, “Annual number of app downloads from the Google Play Store worldwide from 2016 to 2021,” January 3, 2022, available at <https://www.statista.com/statistics/734332/google-play-app-installs-per-year/>.

## 5. Google Play Billing

73. When Android Market launched in October of 2008, it did not include any capability to process payments for purchases of in-app content.<sup>155</sup> Google added the feature in late March 2011 as “In-app Billing.”<sup>156</sup> Google Play Billing is Google’s billing service that facilitates processing payments (and other services) for single, non-recurring purchases of digital content and recurring subscriptions in the Google Play Store.<sup>157</sup> According to Google, Google Play Billing “supports payment methods such as credit cards and direct carrier billing (in which the user can purchase content that then appears on the wireless statement).”<sup>158</sup> Besides processing payments and authorizing purchases, Google Play Billing “tracks products and transactions using purchase tokens and Order IDs” on Google Play Store and provides “post-purchase experiences,” such as reminders about free trials ending, refunds, and subscriptions management.<sup>159</sup> Google describes a purchase token as “a string that represents a buyer's entitlement to a product on Google Play. A purchase token indicates that a Google user is entitled to a specific product that is represented by a purchase

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<sup>155</sup> Brady (Google) Deposition, p. 467 (“Q. And at the time that Android Market launched, was there a capability within Android Market for the payment processing of purchases of in-app content? A. No, I believe that capability was added later.”) and Chu (Meta Platforms (formerly Google)) Deposition, p. 108 (“A. I would be speculating. I don’t recall exactly when in-app billing was added. Q. But it was added sometime after the market launched, correct? A. It was added sometime after, yes.”).

<sup>156</sup> Chu, Eric, “In-app Billing Launched on Android Market,” *Android Developers Blog*, March 29, 2011, available at <https://android-developers.googleblog.com/2011/03/in-app-billing-launched-on-android.html#:~:text=Today%2C%20we%27re%20pleased%20to,purchases%20from%20within%20your%20apps>.

<sup>157</sup> Android, “Google Play’s billing system overview,” June 29, 2022, available at <https://developer.android.com/google/play/billing>.

<sup>158</sup> See, e.g., Android Developers, “Google Play Billing,” available at <https://developer.android.com/distribute/play-billing>; Loew (Google) Deposition pp. 116-117 (“Q. What is a direct carrier billing? A. Direct carrier billing is a form of payment family that we support on Google Play Billing where a user can choose to leverage their carrier relationship like with your cell phone company to complete your payment. There's two ways to do it. One is called a prepaid account, so that's when someone creates -- adds a certain amount to their carrier bill that they can spend towards their telecom, like cell and data provider or anything else they charge their bill. And then there is post paid, which is that you just pay a regular amount and you settle up at the end of the billing period.”); Brady (Google) Deposition pp. 224-25 (“Q. And direct carrier billing is where the consumer can make a purchase through the Android Market and that purchase is then reflected on the bill that they receive from a carrier. Right? A. That's correct.”).

<sup>159</sup> See Android Developers, “Google Play’s billing system overview,” available at <https://developer.android.com/google/play/billing>. See also Kochikar, Purnima, “Google Play’s billing system: Update,” *Google India Blog*, October 5, 2020, available at <https://blog.google/intl/en-in/products/platforms/google-plays-billing-system-update/>.



object.”<sup>160</sup> An Order ID is “a string that represents a financial transaction on Google Play. This string is included in a receipt that is emailed to the buyer.”<sup>161</sup> Google tells developers that they “can use the Order ID to manage refunds in the Google Play Console.”<sup>162</sup>

74. To publish apps on the Google Play Store, developers need to set up a Google Play developer account to access the Google Play Console, a platform for developers to publish and manage their apps on the Google Play Store.<sup>163</sup> After apps have been developed (but before being published on the Play Store), developers must integrate the Google Play Billing Library API, an interface that launches purchase requests and handles transactions, into their apps to enable the sales of in-app digital content.<sup>164</sup> However, some parts of Google’s in-app billing services, such as verifying purchases and issuing refunds, are not available in the Google Play Billing Library API.<sup>165</sup> Thus, developers need to also integrate the Google Play Developer API on the Play Console to

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<sup>160</sup> See Android Developers, “Google Play’s billing system overview,” June 29, 2022, available at <https://developer.android.com/google/play/billing>; Loew (Google) Deposition pp. 53-54 (“What we do is we just let the developer know that the purchase has been successfully completed and then we would pass a purchase token to the developer. So that could be one way that tokenization is used. The developer then should use that purchase token as an acknowledgment that payment has occurred and happened and then they are in charge of entitling the user or provisions the user with their digital good or service that they purchased.”).

<sup>161</sup> See Android Developers, “Google Play’s billing system overview,” June 29, 2022, available at <https://developer.android.com/google/play/billing>; Loew (Google) Deposition p. 57 (“An order ID does get created for every financial transaction whether it’s in sessions and a cart is shown or whether it’s out of session like a subscription renewal.”).

<sup>162</sup> See Android Developers, “Integrate the Google Play Billing Library into your app,” June 29, 2022, available at <https://developer.android.com/google/play/billing/integrate>.

<sup>163</sup> See Android Developers, “Getting ready,” August 17, 2022, available at <https://developer.android.com/google/play/billing/getting-ready>. See also Google Play Console, available at <https://play.google.com/console/about/>.

<sup>164</sup> See Loew (Google) Deposition p. 49 (“Q. Sure. When a consumer makes an in-app purchase in an app that’s been downloaded from the Play Store, is there a set of Google APIs that must be accessed to complete the purchase? A. So if a consumer is purchasing something in a Play-distributed app that is using the Google Play Billing, the developer must be using Google Play Billing APIs to complete that purchase.”); Android Developers, “Getting ready,” August 17, 2022, available at <https://developer.android.com/google/play/billing/getting-ready>. See also Android Developers, “Integrate the Google Play Billing Library into your app,” June 29, 2022, available at <https://developer.android.com/google/play/billing/integrate>.

<sup>165</sup> See Android Developers, “Getting ready,” August 17, 2022, available at <https://developer.android.com/google/play/billing/getting-ready> (“The Google Play Developer API is a server-to-server API that complements the Google Play Billing Library on Android. This API provides functionality not available in the Google Play Billing Library, such as securely verifying purchases and issuing refunds to your users.”).

complete the integration of Google Play Billing.<sup>166</sup> I understand, from reviewing the Google Payments Policy and the deposition of Lawrence Koh, that Google Play Billing does not include general customer service, refund services after 48 hours from purchase, or any content delivery.<sup>167</sup> Google provides only confirmation of payment to the developer and it is “the developer that delivers the in-app content to the users.”<sup>168</sup>

75. Until 2018, Google charged an average commission of 30% on developers of all purchase types in the Google Play Store, for which Google required the use of Google Play Billing (as shown in Exhibit 36).<sup>169</sup> In recent years, Google has implemented some limited changes to its commission structure. Exhibit 10 below summarizes Google’s most recent commission structure as of January 1, 2022. For example, Google implemented a separate policy for developers whose users are in South Korea, due to a regulatory change requiring that developers be permitted to use alternative in-app billing systems instead of Google Play Billing. For these developers, “the service fee for such transactions using the Additional Billing System is equal to the service fee applicable

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<sup>166</sup> See, e.g., Android Developers, “Google Play Billing,” available at <https://developer.android.com/distribute/play-billing>. See also Android Developers, “Getting ready,” August 17, 2022, available at <https://developer.android.com/google/play/billing/getting-ready> (“The Google Play Developer API is a server-to-server API that complements the Google Play Billing Library on Android. This API provides functionality not available in the Google Play Billing Library, such as securely verifying purchases and issuing refunds to your users.”); and Samat (Google) Deposition, pp. 470-471 (“Q. And those developers were required to use Google’s proprietary billing system with certain exceptions; correct? A. Well, there is an integrated set of payment APIs that are part of the Google Play platform. [...] Q. So the answer to my question was yes, they were required to use Google’s proprietary billing system; correct? A. Well, as I said, they were required to integrate with a set of payment APIs and flows that were part of the Google Play platform”).

<sup>167</sup> See, e.g., Google Play Help, “Learn about refunds on Google Play,” available at <https://support.google.com/googleplay/answer/2479637?hl=en-GB#:~:text=Your%20Play%20Pass%20subscription%20can,month%20in%20which%20you%20cancelled> (“It’s less than 48 hours since you bought an app or made an in-app purchase: you can request a refund through Google Play.”); and Play Console Help, “Understanding Google Play’s payments policy,” available at <https://support.google.com/googleplay/android-developer/answer/10281818>. See also Koh (EA (formerly Google)) Deposition, p. 383 (“Q. So in the example that you provided, Google is providing to the developer confirmation that the user paid for the content, but the developer is releasing the content to the user? A. That is correct. Q. It’s the developer that delivers the in-app content to the users, not Google; right? A. Yes, that is correct”).

<sup>168</sup> See Koh (EA (formerly Google)) Deposition, p. 383 (“Q. So in the example that you provided, Google is providing to the developer confirmation that the user paid for the content, but the developer is releasing the content to the user? A. That is correct. Q. It’s the developer that delivers the in-app content to the users, not Google; right? A. Yes, that is correct.”).

<sup>169</sup> Note that the commission rate is averaged by developer in each year. Google Transaction Data. See Rysman Workpapers.

for transactions via Google Play’s billing system reduced by 4%.<sup>170</sup> Additionally, in the European Economic Area (EEA), Google recently announced “a new program to support billing alternatives for European Economic Area (EEA) users, allowing developers of non-gaming apps selling digital content or services the option of offering their users in the EEA an alternative to Google Play’s billing system... When a consumer uses an alternative billing system, the service fee the developer pays will be reduced by 3%.<sup>171</sup> The changes in Google Play’s commission structure are summarized in Exhibit 10 below:

**Exhibit 10**  
**Changes to Google Play Billing’s Commission Tier**

Target group	Effective Date	Commission tier
Developers who are enrolled in the 15% commission tier	July 1, 2021	15% for the first \$1M (USD) of earnings each year
Developers who are enrolled in the 15% commission tier	July 1, 2021	30% for earnings in excess of \$1M (USD) each year
Developers who are not enrolled in the 15% commission tier	Since at least 2012	30%
Developers who offer alternative in-app billing system in South Korea	December 18, 2021	Commission reduced by 4%
Automatically renewing subscription products purchased by subscribers	January 1, 2022	15%
Developers enrolled in User Choice Billing pilot program	September 1, 2022	Commission reduced by 4%

*Note:*

1. Commission tiers with an effective date since at least 2012 are indicated by the average commission rate across developers, based on Google Transaction data.
2. While Google is advertising a 4% reduction in the commission, Spotify, the only current member of the User Choice Billing program, pays [REDACTED]

[REDACTED]. See Alzetta (Spotify) Deposition p. 43 (“[REDACTED]”).

<sup>170</sup> See Play Console Help, “Service fees,” available at <https://support.google.com/googleplay/android-developer/answer/112622>. See also Park, Kate, “South Korea passes ‘Anti-Google law’ bill to curb Google, Apple in-app payment commission,” August 31, 2021, available at <https://techcrunch.com/2021/08/31/south-korea-passes-anti-google-law-bill-to-curb-google-apple-in-app-payment-commission/>.

<sup>171</sup> See Play Console Help, “Offering an alternative billing system for users in the European Economic Area (EEA),” available at [https://support.google.com/googleplay/android-developer/answer/12348241?hl=en&ref\\_topic=3452890](https://support.google.com/googleplay/android-developer/answer/12348241?hl=en&ref_topic=3452890).

*Sources:*

1. Google, “Service fees,” 2022, available at <https://support.google.com/googleplay/android-developer/answer/112622>.
2. Google, “Enrolling in the user choice billing pilot,” 2022, available at <https://support.google.com/googleplay/android-developer/answer/12570971?hl=en>.
3. Google, “Changes to Google Play’s service fee in 2021,” 2021, available at <https://support.google.com/googleplay/android-developer/answer/10632485?hl=en>.
4. Google Transaction Data.

76. Note that digital wallets such as Google Pay are different from in-app billing services like Google Play Billing. Google Pay is a payment system that allows consumers to store their credit card information in the “digital wallet” on their mobile device and make purchases or send money with their smartphones.<sup>172</sup> Transactions on Google Pay are executed via third-party “payment processors” (e.g., Braintree and Stripe) employed by the app developer.<sup>173</sup> While Google Pay does not charge users or merchants for payments, merchants have to pay commissions to the payment processors they use.<sup>174</sup> Google Pay cannot generally be used to purchase apps on the Google Play Store or to purchase in-app content from the Google Play Store outside the U.S. and U.K.<sup>175</sup> Payment *methods*—such as credit cards, direct carrier billing, cash, and gift cards—are likewise distinct from in-app billing services.

## 6. Google Play Points

77. In 2018, Google launched the Google Play Points rewards program, which “rewards users for any purchase they make on Play — including apps, games, in-app items, music, movies, books, and subscriptions - and for downloading select apps and games” and lets participants use

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<sup>172</sup> See, e.g., Google Play Help, “What is Google Pay?” available at <https://support.google.com/pay/answer/9026749?hl=en-GB&co=GENIE.Platform%3DAndroid>.

<sup>173</sup> A list of payment processors that support Google Pay can be found in Google Pay, “Participating processors,” available at <https://developers.google.com/pay/api/participating-processors>.

<sup>174</sup> See, e.g., Google Developers, “Frequently Asked Questions - Google Pay API,” February 9, 2022, available at <https://developers.google.com/pay/api/web/support/faq> (“Google Pay doesn't additionally charge users, merchants, and developers additional fees to use the Google Pay API for payments. Merchants, specifically, continue to pay processing fees to their payment processor.”).

<sup>175</sup> Play Console Help, “Accepted payment methods on Google Play,” available at <https://support.google.com/googleplay/answer/2651410> (“In the United States and United Kingdom, you can use your Google Pay balance to pay for your purchase. Simply make sure there's enough money in your Google Pay balance to cover the total amount of the purchase.”).

points to get discount coupons, in-app items, or Google Play Credit.<sup>176</sup> Google initially launched Google Play Points in Japan and then South Korea and subsequently rolled out the program to 28 countries with plans to keep expanding (as of May 2022).<sup>177</sup> It was launched in the U.S. in November 2019.<sup>178</sup> The points system is tiered, allowing users who collect enough points in a calendar year to “level up,” earning the user even more points and benefits.<sup>179</sup> In the U.S., users earn “1 point for every \$1 USD [they] spend with Google Play.”<sup>180</sup>

78. As noted in Google internal documents, Google launched the Play Points program in response to potential competitive threats to the Play Store: “Beyond global expansion, Points can help drive user behavior – from first time onboarding to deep catalogue engagement to further exploration of all Play, Android and Google has to offer[.] Points can also reward users with physical goods and with more redemption options through 3P partnerships.”<sup>181</sup>

79. When choosing to launch Google Play Points in Korea, Google cited Korea’s “scale and competitor dynamics” and “competition from multiple android stores,” specifically referencing

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<sup>176</sup> See 9to5Google, “Google Play Points rewards program goes official, only works in Japan for now,” September 18, 2018 available at <https://9to5google.com/2018/09/18/google-play-points-official-rewards-program-japan/>. However, Google Play Store only expanded to the U.S. in 2019 (See AndroidGuys, “Google Play Store rewards program expands to US,” November 4, 2019, available at <https://www.androidguys.com/news/google-play-points-play-store-rewards-program>). See also Google Play Help, “Join Google Play Points,” available at <https://support.google.com/googleplay/answer/9077312?hl=en&co=GENIE.CountryCode%3DU> (hereafter “Join Google Play Points”); and Android Developers Blog, “Introducing Google Play Points in the U.S.,” November 4, 2019, available at <https://android-developers.googleblog.com/2019/11/introducing-google-play-points-in-us.html>.

<sup>177</sup> See 9to5Google, “Google Play Points rewards program goes official, only works in Japan for now,” September 18, 2018 available at <https://9to5google.com/2018/09/18/google-play-points-official-rewards-program-japan/>; Mu-Hyun, Cho, “Google Play introduces reward points in South Korea,” *ZDNet*, April 22, 2019, available at <https://www.zdnet.com/article/google-play-introduces-reward-points-in-south-korea/>; Mok, Winston, “Google Play Points: a rewards program for all the ways you Play,” November 4, 2019, available at <https://www.blog.google/products/google-play/google-play-points-rewards-program-all-ways-you-play>; and Google Play, “Google Play Points,” available at <https://play.google.com/console/about/programs/googleplaypoints/>.

<sup>178</sup> Mok, Winston, “Google Play Points: a rewards program for all the ways you Play,” November 4, 2019, available at <https://www.blog.google/products/google-play/google-play-points-rewards-program-all-ways-you-play>.

<sup>179</sup> See Join Google Play Points.

<sup>180</sup> Join Google Play Points. There is some variation in the program across certain geographies.

<sup>181</sup> See Google, “Play 2021/25,” October 28, 2020, GOOG-PLAY-002650052.R-138.R, at 076.R.

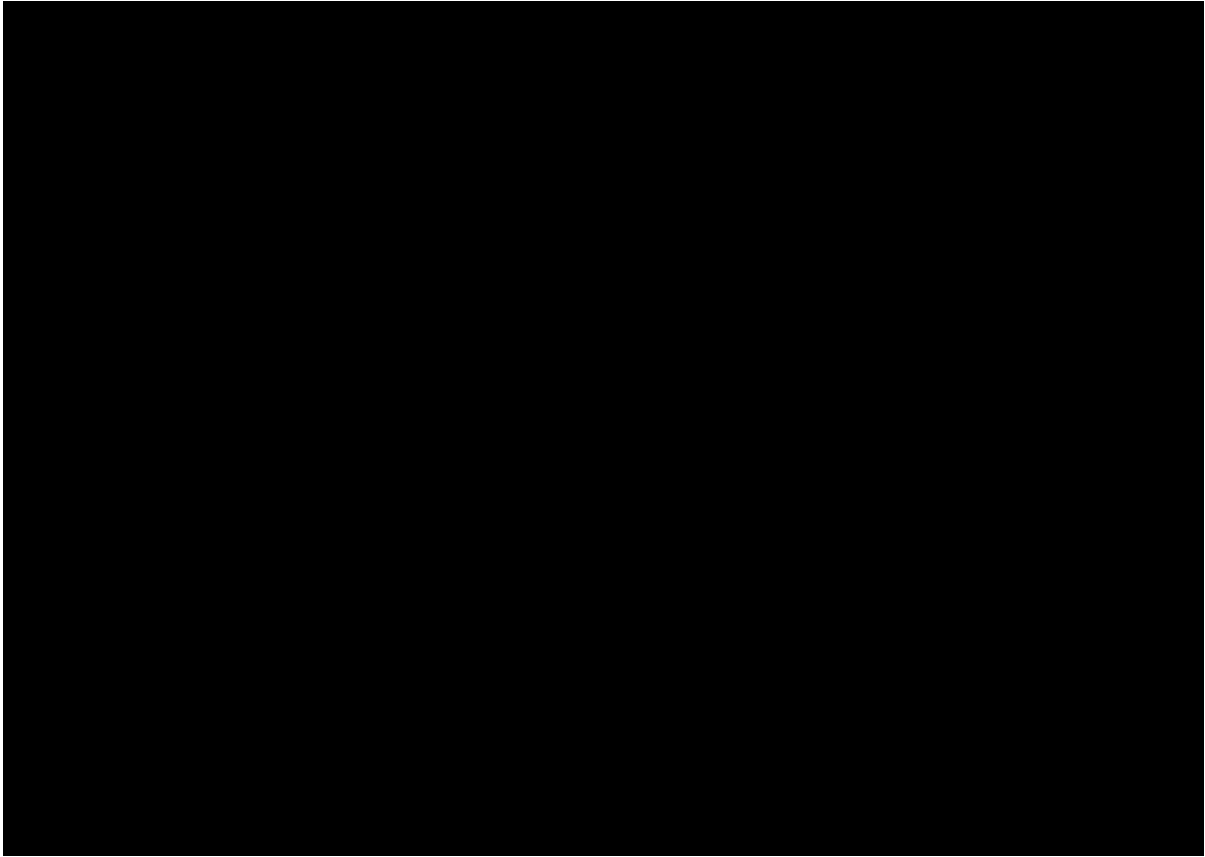
the One store in Korea: “Strong native distribution (██████ of Play HVUs [high value users] use Samsung phone, All phones pre-installed w/One Store).”<sup>182</sup>

80. Google expected increased loyalty would lead to increased spending and retain users within the Play Store. For example, when introducing the program, Google noted “strong engagement” and “promising early results,” including an uplift in spend from the initial Play Points campaign.<sup>183</sup> Google Play Store transaction data demonstrates [REDACTED]. [REDACTED]. Exhibit 11 shows that the volume of transactions earning Play Points [REDACTED].

<sup>182</sup> See Google, “JP Play Points Launch Update,” November 2, 2018, GOOG-PLAY-000286779.R-847.R, at 842.R. See also Chadhoury, Saheli Roy and Sam Shead, “South Korea passes bill limiting Apple and Google control over app store payments,” *CNBC*, September 1, 2021, available at <https://www.cnbc.com/2021/08/31/south-korea-first-country-to-curb-google-apples-in-app-billing-policies.html>.

<sup>183</sup> See Google, “JP Play Points Launch Update,” November 2, 2018, GOOG-PLAY-000286779.R-847.R, at 781.R.

**Exhibit 11**



*Source:* Google Transaction Data.

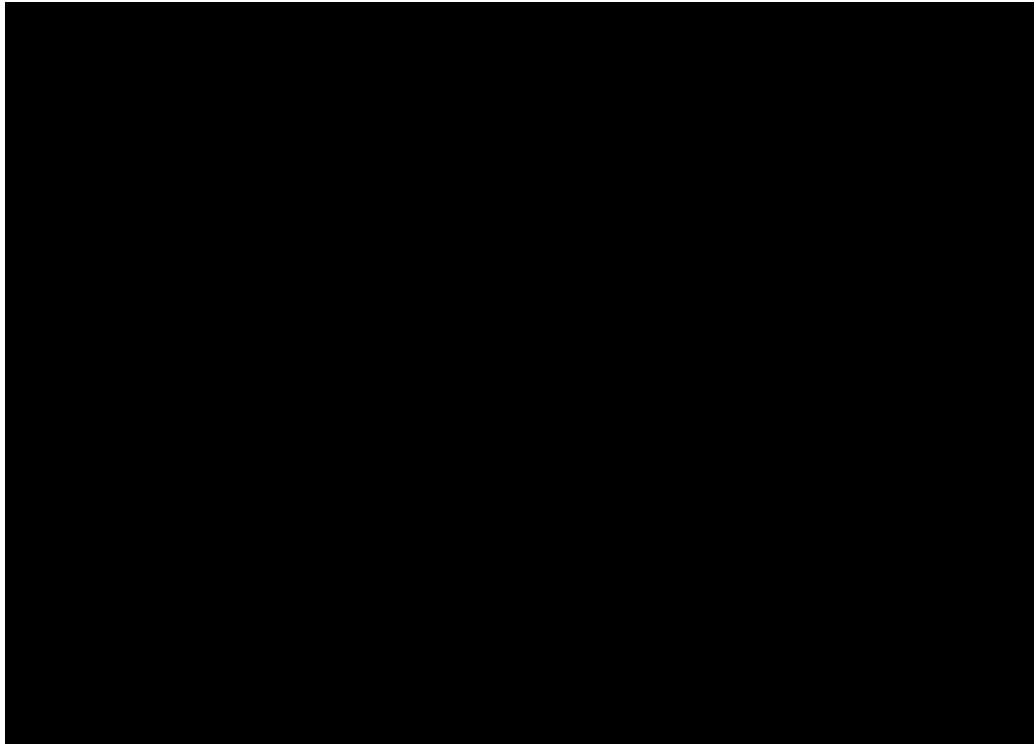
81. Moreover, the number of Android users enrolled in Play Points has also steadily increased [REDACTED] (see Exhibit 12 and Exhibit 13<sup>185</sup>).

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<sup>184</sup> Exhibit 11, Exhibit 12, and Exhibit 13 are based on a 10% random sample of the Google Transactions Data for 2012 to July 3, 2021. The developers are worldwide excluding Chinese developers. All transactions relate to U.S. consumers.

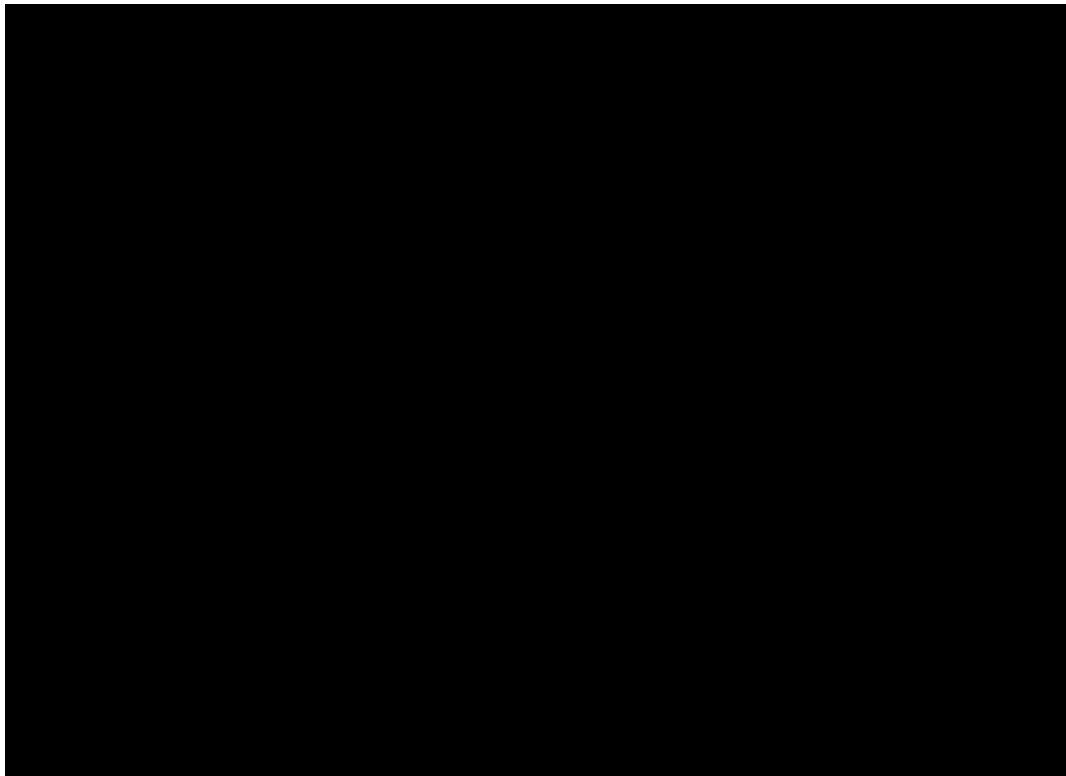
<sup>185</sup> Play Points analysis in Exhibit 12 and Exhibit 13 are based on a 10 percent random sample of the Google Transactions Data for the period 2012 to July 3, 2021. The developers are worldwide excluding Chinese developers. All transactions relate to U.S. consumers.

**Exhibit 12**



*Source:* Google Transaction Data.

**Exhibit 13**



**NON-PARTY AND PARTY HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**



*Source:* Google Transaction Data.

82. Further discussion and analysis of Google Play Points is provided in Section VII.B.4.

### **B. Google's Agreements with Carriers, OEMs, and Developers**

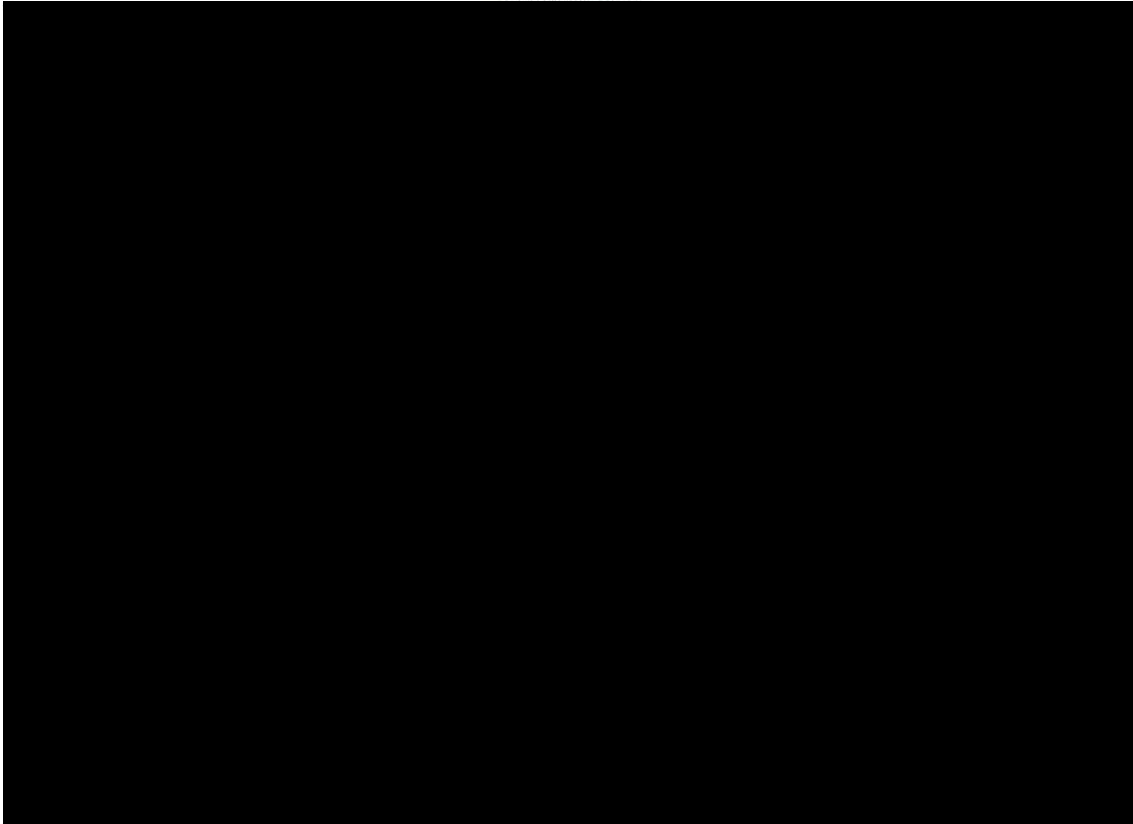
83. Google's relationships with OEMs, MNOs, developers, and consumers relating to the Android OS and Google Play Store are governed by an array of complex and interconnected contracts. I summarize below my general understanding of these agreements, which is based on my team's review of Google's agreements and testimony from Google witnesses explaining them. Where appropriate, I generalize based on specific examples of these agreements; however, I understand Google entered these agreements with different partners, at different times, and some agreements may have custom amendments that others do not. My team has attempted to record, as shown in the exhibits in my report, a core set of agreements that Google has executed with the largest OEMs. My use of examples below is for illustrative purposes only; the actual terms of the agreements themselves governed particular partners. I reserve the right to offer testimony on any particular agreement if asked to do so.

84. Google's agreements with partners vary in the degree of "control" Google has over the particular device subject to the agreement, as depicted in the excerpt from a Google document in Exhibit 14 below.<sup>186</sup>

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<sup>186</sup> Google, "CTS and GMS Overview," May 23, 2013, GOOG-PLAY-009295801-815, at 814; Brady (Google) Deposition, p. 210 ("Q. So the higher up on this chart the agreement is listed, the more control Google has over the implementation on a given device? A. Yes. Yup").

**Exhibit 14**



Source: Google, [REDACTED] May 23, 2013, GOOG-PLAY-009295801-815, at 814.

85. In the subsections that follow, I first summarize the categories of agreements that Google has entered into with OEMs and other Android-related documentation (see Sections IV.B.1-IV.B.5). I then summarize the agreements with developers that govern their publication of apps on the Google Play Store and their sale of apps and in-app content using Google Play Billing (see Section IV.B.6). Finally, I summarize the Google terms to which Android smart mobile device end-users must agree if they want to consummate a transaction for in-app content through Google Play (see Section IV.B.7).

*1. Apache License*

86. Google explains that “[t]he majority of the Android platform and documentation is licensed under the Apache 2.0 license,” with some exceptions for source code documentation “that

is licensed under GPLv2 or [an]other license.”<sup>187</sup> The Apache 2.0 license does not require negotiations between Google and the partner; the partner agrees to its terms as a matter of course in distributing smart mobile devices with the Android OS.<sup>188</sup> The Apache 2.0 license grants a “perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable” copyright and patent license to reproduce or create derivative versions of the Android OS source code (*i.e.*, the AOSP code) but “does not grant permission to use the trade names, trademarks, service marks, or product names” for Android.<sup>189</sup> Amazon is an example of an OEM with an open-source Android license that has designed an Android fork.<sup>190</sup>

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<sup>187</sup> Android Open Source Project, “Content License,” available at <https://source.android.com/license#:~:text=The%20majority%20of%20the%20Android,under%20GPLv2%20or%20other%20license> (hereafter “Content License”); Brady (Google) Deposition, pp. 42-43 (“22 Q. And what did you mean when you said Android is an open source mobile platform? A. I meant that Android was a mobile operating system that was provided as open source software to run on mobile phones. Q. And it was provided open source under the Apache license. Do you recall that? A. Primarily under the Apache license. There [are] a number of licenses for different components in the open source distribution. Q. Understanding that parts of the Linux [kernel] are licensed under something separate. Right? A. Correct. And there are other components that are licensed under a different license. But the primary license for Android would have been Apache, yes.”); and Rosenberg (Google) Deposition, p. 187 (“Q. And Google released Android under an open source license? A. Yes. Q. And part of software being open source is that it is free, right? A. Correct. Q. Google gave Android operating system away for free from the beginning? A. Yes.”).

<sup>188</sup> Brady (Google) Deposition p. 208 (“And so starting from the bottom, the Apache license, that would be something that an OEM enters into sort of as a matter of course by downloading the open source Android code. Right? A. That’s a good question. Probably not by downloading it. But if they were to use the software, create derivative works and ship it, then I think their use, their commercial use of that software is governed by the Apache license.”); The Apache Software Foundation, “Apache License, Version 2.0,” available at <https://www.apache.org/licenses/LICENSE-2.0> (hereafter “Apache License, Version 2.0”), at §§ 2-3.

<sup>189</sup> Apache License, Version 2.0, § 6; *see also* Content License (“While the documentation itself is available to you under the Apache 2.0 license, note that proprietary trademarks and brand features are not included in that license. Google’s trademarks and other brand features (including the android stylized typeface logo) are not included in the license.”); and EC Google Android Decision, ¶ 156 (“The AOSP [Android Open Source Project] license further does not grant members of the Android ecosystem the right to use the Android logo and other Android related trademarks that Google owns.”).

<sup>190</sup> *See* Morrill (Amazon) Deposition, p. 214 (“Q. And which option did Amazon choose? A. Ultimately we ended up using Android Open Source as the – as the underpinning for FireOS. Q. Is FireOS what’s known as a fork of open source Android? A. That’s what it’s commonly referred to, yes.”). *See also*, Hines, Mike, “Over 75% of Android Tablet Apps We Tested Just Work on Kindle Fire, with No Additional Development Required,” Amazon developer, August 21, 2013, available at <https://developer.amazon.com/blogs/post/Tx5Z9RFM248DMJ/Over-75-Of-Android-Tablet-Apps-We-Tested-Just-Work-On-Kindle-Fire-With-No-Additi#>; Stanton, William, “Is the Amazon Fire Tablet Considered an Android Device?” Alphr, April 13, 2020, available at <https://www.alphr.com/amazon-fire-tablet-android-device/>; Ziegler, Chris, “What is an ‘Android device’?” The Verge, December 29, 2011, available at <https://www.theverge.com/2011/12/29/2668214/what-is-an-android-device>.

## 2. *Mobile Application Distribution Agreement (“MADA”)*

87. Google’s MADA agreements impose several requirements on OEMs. First, the MADAs mandate compliance with a number of other Google agreements and restrictions, including the AFA and ACC (and through them, the CDD and CTS), all explained below.<sup>191</sup> Pre-2016 MADAs also contain an agreement by the OEM not to “take any actions that may cause or result in the fragmentation of Android.”<sup>192</sup> Second, the MADAs require an OEM to preload the entire suite of GMS apps, including Google Play, if an OEM wants to preload any GMS app.<sup>193</sup> Third, the MADAs require the icons for certain Google apps, including the Google Play Store, to appear on the device’s home screen, although the placement requirements have changed over time. In the Android Market era, the placement requirement was the “phone top”—the first page displayed when the device powered on.<sup>194</sup> Around the time of the launch of the Google Play Store, Google began executing MADAs with OEMs permitting the Play Store icon to be installed up to

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<sup>191</sup> Google, “HTC MADA (Nov. 1, 2017 – Oct. 1, 2019 term),” November 1, 2017, GOOG-PLAY-009640439-467, at 445 (“[S]ubject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term”); Google, “HMD MADA (Apr. 1, 2017 – May 31, 2017 term),” April 1, 2017, GOOG-PLAY-000618261-281, at 264 (“[S]ubject to the Company being in compliance with a valid and effective Anti-Fragmentation Agreement, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .”); and Google, “Huawei MADA (Jan. 1, 2011 – Dec. 31, 2012),” January 1, 2011, GOOG-PLAY-000857382-393, at § 2.7 (“The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device”).

<sup>192</sup> See, e.g., Google, “Lenovo MADA (July 1, 2010 – June 30, 2012),” July 1, 2010, GOOG-PLAY-001089998-011, at § 2.2 and Google, “Lava MADA (Nov. 1, 2014 – Oct. 31, 2016),” November 1, 2014, GOOG-PLAY-000617749 -766 , at 753.

<sup>193</sup> Google, “CTS and GMS Overview,” May 23, 2013, GOOG-PLAY-009295801-815, at 810 (“Mandatory apps are an integrated suite, partners can’t cherry-pick.”); Brady (Google) Deposition, pp. 201-202 (“Q. And what that means in practice is that an OEM that signs a MADA has no obligation to actually distribute the Google apps licensed under the MADA, but if they distribute any, they must take and distribute all the mandatory ones. Is that right? A. That is correct. With caveats around geographic availability and things like that. But generally yes.”); Li (Google) Deposition, p. 194 (“Q. If an OEM would like to pre-install any of the required apps on a device under the terms of the MADA, that OEM must pre-install all of the required apps on that device; correct? A. Yes.”); and Email from Doug Yeum, Google, to Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, “Subject: Re: quick question on Market,” April 27, 2010, GOOG-PLAY4-000341393-394, at 393 (“Do you know if our Android team is ever planning to unbundle the apps in GMS and allow partners to pick and choose what Google apps to preload on their devices? [ . . . ] Right now it’s all or nothing”).

<sup>194</sup> See, e.g., Google, “ASUS MADA (Nov. 1, 2009 – Dec. 31, 2011),” November 1, 2009, GOOG-PLAY-001477713-726 , at § 3(d)(2) (“Google Phone Top Search and Android Market Client must be on the Device phone top”) and 1.16, (“‘Phone Top’ means with respect to the default navigation hierarchy of a Device UI, the top-most level screen from which applications can be launched by an End User”).

one swipe away<sup>195</sup> from the “default home screen,” the screen that appears upon powering up the device without a swipe in any direction.<sup>196</sup> More recent MADAs required placement of the Play Store on the default home screen itself, but OEMs could comply with that requirement by placing the Google Play Store with other mandatory GMS apps in a folder on the default home screen.<sup>197</sup>

88. Nearly all major OEMs besides Huawei and Amazon have a MADA with Google.<sup>198</sup> A summary of each MADA executed with major OEMs is attached as Appendix D.

### 3. *Anti-Fragmentation Agreement (“AFA”) and Android Compatibility Commitment (“ACC”)*

89. Historically, Google’s MADAs have required OEMs to sign an AFA (and more recently, an ACC) as a condition of licensing GMS apps from Google.<sup>199</sup> By executing an AFA with Google, an OEM agreed, among other things, (a) “not [to] take any actions that may cause or result in the fragmentation of Android”; (b) to “only distribute Products that...[are] Android Compatible Devices” or run on Android Compatible Devices; and (c) not to distribute any “software development kit (SDK) derived from Android” or “participate in the creation of, or

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<sup>195</sup> See, e.g., Google, “LG MADA (executed Jan. 25, 2011),” January 1, 2011, GOOG-PLAY-000857437-448, at 440 (“Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen”).

<sup>196</sup> Brady (Google) Deposition, pp. 202-203 (“Q. Okay. Can you describe for me what the default home screen is? A. ...But I believe it is the default home screen is the home screen – is the screen that would be displayed when the user first unlocks the device or turns on the device. Or which they would access by hitting the home button on the device”).

<sup>197</sup> See, e.g., Google, “Motorola-Google MADA (Dec. 1, 2018 – Dec. 31, 2019 term),” December 1, 2018, GOOG-PLAY-000808375-397, at 384 (requiring OEMs to “distribute on the Default Home Screen . . . (ii) the Google Play Store icon”); Google, “Kyocera MADA (July 1, 2017 – June 30, 2019 term),” July 1, 2017, GOOG-PLAY-000618559-581, at 567-568 (“Company agrees to the following placement and setup requirements with respect to Android Compatible Devices . . . (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): . . . (ii) the Google Play Store icon”); and Rosenberg (Google) Deposition, p. 196-197 (“Q. Google has, as part of the MADA, required at least since 2016 that the Play Store be placed on the home screen of devices; is that right? A. That’s correct”).

<sup>198</sup> Kolotouros (Google) Deposition, p. 93 (“Q. So in terms of OEMs, other than Huawei and Amazon, with respect to the Amazon variant of Android, are there any other OEMs that come to mind that you’re aware of that have not signed a MADA? A. No, not within like the mobile [/] tablet category”).

<sup>199</sup> Brady (Google) Deposition, pp. 190-191 (“Q. And an OEM had to sign an anti-fragmentation agreement with Google as a condition to being able to be a licensee of Google Mobile Services, including Android Market and the Play Store. Right? A. That’s correct”).

promote in any way, any third party” Android SDK.<sup>200</sup> Android Compatible Devices, in turn, meant devices that “comply with the Android Compatibility Definition document...and (ii) successfully pass the Android Compatibility Test Suite (CTS).”<sup>201</sup>

90. In 2015, the European Commission opened proceedings “against Google to investigate ... conduct in relation to its Android mobile operating system as well as applications,”<sup>202</sup> and to investigate, among other things, “whether Google has illegally hindered the development and market access of rival mobile applications or services by requiring or incentivising smartphone and tablet manufacturers to exclusively pre-install Google’s own applications or services.”<sup>203</sup> In July 2018, the EC concluded that, among other things, Google’s “licensing of the Play Store and the Google Search app conditional on hardware manufacturers agreeing to the anti-fragmentation obligations in the AFAs...constitutes an abuse of Google’s dominant positions in the worldwide market (excluding China) for Android app stores.”<sup>204,205</sup>

91. Following the European Commission’s investigation into Google’s Android business practices, Google “informed the Commission of its intention to notify hardware manufacturers of the option to enter into an ‘Android Compatibility Commitment’ (‘ACC’) in place of an AFA.”<sup>206</sup> I

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<sup>200</sup> “Anti-Fragmentation Agreement between Google and Samsung Electronics Co.,” May 9, 2012, GOOG-PLAY-003604523-525, at 523.

<sup>201</sup> “Anti-Fragmentation Agreement between Google and Samsung Electronics Co.,” May 9, 2012, GOOG-PLAY-003604523-525, at 523.

<sup>202</sup> European Commission, “Antitrust: Commission sends Statement of Objections to Google on Android operating system and applications,” April 20, 2016, *available at* [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_16\\_1492](https://ec.europa.eu/commission/presscorner/detail/en/IP_16_1492).

<sup>203</sup> *See* European Commission, “Antitrust: Commission opens formal investigation against Google in relation to Android mobile operating system,” *available at* [https://ec.europa.eu/commission/presscorner/detail/en/MEMO\\_15\\_4782](https://ec.europa.eu/commission/presscorner/detail/en/MEMO_15_4782).

<sup>204</sup> “Summary of Commission Decision of 18 July 2018 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement (Case AT.40099 – Google Android),” *Official Journal of the European Union*, November 28, 2019, ¶¶ 18-20, *available at* [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC1128\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC1128(02)&from=EN).

<sup>205</sup> On September 14, 2022, the Court of Justice of the European Union “largely confirms the Commission’s decision that “Google imposed unlawful restrictions on manufacturers of Android mobile devices,” and imposing a fine of €4.125 billion. *See* Court of Justice of the European Union, “Judgment of the General Court in Case T-604/18 | *Google and Alphabet v Commission (Google Android)*,” September 14, 2022.

<sup>206</sup> *See* EC Google Android Decision, ¶ 170; Li (Google) Deposition. pp. 118-119 (“[Q.] What’s the difference between an ACC and an Anti-Fragmentation Agreement or AFA? A. I think in spirit they are meant – it’s the successor of the AFA. Q. What’s the difference between the AFA and ACC? A. The ACC is a later version of the AFA.”).



understand that major OEMs entered ACCs over time as their AFAs expired.<sup>207</sup> The ACC represents the OEM's agreement to "only distribute Android devices that are Android-Compatible Devices" – i.e., the devices must "pass the compatibility test suite [and] comply with [the] CDD."<sup>208</sup> Google explains that the primary differences between the AFA and the ACC is that the latter permits OEMs to make, or provide parts for, incompatible Android smart mobile devices for third parties if those devices are marketed under third-party brands.<sup>209</sup> Google explains that the ACCs have a three-year term and are a "[s]tandard contract, [without] much difference between parties."<sup>210</sup>

92. Following the EC Google Android Decision, I understand Google has not enforced the ACC requirements in the European Economic Area ("EEA") since October 19, 2018, permitting OEMs to offer first-party non-compatible Android smart mobile devices in the EEA only.<sup>211</sup>

#### 4. *Android Compatibility Test Suite ("CTS") and Compatibility Definition Document ("CDD")*

93. For an OEM to market its device as an Android device, the OEM's implementation of Android must (1) be compatible with the standardized Android build that Google specifies in the

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<sup>207</sup> Because the ACC is a condition to executing a MADA, I understand that all MADA signatories are ACC signatories, and I also understand that the reverse is true, and that there are no ACC signatories that have not also executed a MADA. *See* Kolotouros (Google) Deposition, p. 92 ("Q. Is there any Android OEM that has signed an AFA or ACC that has not signed a MADA? A. Not to my knowledge, no."). Appendix D summarizes the major OEMs that have executed MADAs.

<sup>208</sup> Google, "Android 101," GOOG-PLAY-000128863.R-908.R, at 877.R; Google, "Android Compatibility Commitment, Google-HTC," November 18, 2020, GOOG-PLAY-001090167-170, at 167.

<sup>209</sup> Google, "Android Agreements Explainer – ACC, MADA, RSA, DCB," February 2, 2018, GOOG-PLAY-001559464.R-496.R, at 477.R ("Carve out to allow companies to manufacture non-compatible Android devices and components as long as they're sold to and marketed under the brand of a 3<sup>rd</sup> party"); EC Google Android Decision ¶ 171.

<sup>210</sup> Google, "Android Agreements Explainer – ACC, MADA, RSA, DCB," (February 2, 2018, GOOG-PLAY-001559464.R-496.R, at 477.R.

<sup>211</sup> Lockheimer, Hiroshi, "Complying with the EC's Android decision," *Google*, October 16, 2018, available at <https://www.blog.google/around-the-globe/google-europe/complying-ecs-android-decision/> ("First, we're updating the compatibility agreements with mobile device makers that set out how Android is used to develop smartphones and tablets. Going forward, Android partners wishing to distribute Google apps may also build non-compatible, or forked, smartphones and tablets for the European Economic Area (EEA)").

Android Compatibility Definition Document (“CDD”),<sup>212</sup> and (2) pass a software test that evaluates a device’s compliance with aspects of the CDD known as the Compatibility Test Suite (“CTS”).<sup>213</sup> Each version of Android has a corresponding CDD.<sup>214</sup> While Google might solicit input from partners and modify the CDD in response to that input, Google publishes the CDD and retains final control over the contents of the CDD.<sup>215</sup> The CDD has numerous requirements; for example, it governs screen size so that the Android user interface displays properly.<sup>216</sup>

94. The current CDD for Android 12 states that the OEM’s implementation of Android OS contains requirements regarding “unknown sources” and potentially harmful applications:<sup>217</sup>

- “MUST NOT install application packages from unknown sources, unless the app that requests the installation meets all the following requirements: It MUST declare the REQUEST\_INSTALL\_PACKAGES permission or have the android:targetSdkVersion set at 24 or lower. It MUST have been granted permission by the user to install apps from unknown sources.”

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<sup>212</sup> Android Open Source Project, “Android Compatibility Definition Document,” available at <https://source.android.com/compatibility/cdd> (hereafter “Android Compatibility Definition Document”).

<sup>213</sup> Android Open Source Project, “Compatibility Test Suite,” available at <https://source.android.com/compatibility/cts> and Android Open Source Project, “Android Compatibility Program Overview,” available at <https://source.android.com/compatibility/overview>.

<sup>214</sup> Android Compatibility Definition Document (“For each release of the Android platform, a detailed CDD will be provided.”), <https://source.android.com/docs/compatibility/cdd>, visited Sept. 30, 2022.

<sup>215</sup> Rosenberg (Google) Deposition, p. 189 (“Q. And Google decides when a device developed based on the Android code can be deemed Android compatible or not, right? A. Well, we define compatibility in that context.”); Brady (Google) Deposition, p. 443 (“Q. So in the second scenario, where the CDD requirement was valid but the OEM was not meeting the requirement, was the OEM ever allowed to, you know, make the device available not having met the requirement? A. Not to my knowledge. Not without us deciding to amend or change the CDD. You know, as a result of that discussion, basically.”); Li (Google) Deposition, pp. 124-125 (“Q. Google maintains the compatibility definition document; is that right[]? A. I believe the process is Google is a stakeholder in the CDD and it’s something that we define every single year with our partners to make sure that we’re advancing the ecosystem together as one unit.”); and EC Google Android Decision, ¶¶ 163 (“The conditions for the Android compatibility tests are determined at Google’s sole discretion”) and 1072 (“Google may change the specific CDD/CTS clauses at any time, given that it has the right to amend them unilaterally.”).

<sup>216</sup> Android 12, “Compatibility Definition,” at § 7.1.1, available at <https://source.android.com/docs/compatibility/android-cdd.pdf>. See Li (Google) Deposition, pp. 493-494.

<sup>217</sup> Android 12, “Compatibility Definition,” at § 4 C-0-6 and C-0-7, available at <https://source.android.com/docs/compatibility/android-cdd.pdf>.



- “MUST display a warning dialog with the warning string that is provided through the system API PackageManager.setHarmfulAppWarning to the user before launching an activity in an application that has been marked by the same system API PackageManager.setHarmfulAppWarning as potentially harmful.”

As described in further detail below, I understand (i) these CDD requirements generate warning pop-ups when an Android user attempts to install an app from a source besides the Play Store or an app store that has been preloaded on the device and granted install permissions;<sup>218</sup> and (ii) to overcome this setting, the user must navigate to “Settings” in the Android UI, select “Install unknown apps,” and then grant permissions to an alternative app store or a browser (for sideloading or direct downloading) to install apps.<sup>219</sup>

95. Thus, based on the documents and testimony I have reviewed, I understand the current version of Android OS requires the user to proceed through two rounds of granting permissions in the smart mobile device Settings – first to sideload the app store and then to install an app from that sideloaded app store – to enable app install permissions from each app that the user wishes to install. Each round involves clicking “Settings” on a warning pop-up, enabling the installation on the Settings page, and then again confirming that a user wishes to install the app in response to a second pop-up.

96. As depicted in Exhibit 14 above, Google notes that its CDD and CTS agreements are at the lower end of its spectrum of “control” over smart mobile devices running Android.

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<sup>218</sup> Cunningham (Google) Deposition, pp. 405-406 (“Q. And C-0-6 reads ‘Must not install application packages from unknown sources, unless the app that requests the installation meets all the following requirements,’ and then it lists two requirements. Do you see that? A. I do see that, yes. Q. And so this sets out the requirement that to be Android compatible a device must not install from an unknown source unless those two conditions are met, correct? A. Yes, I think that matches my understanding.”); Cunningham (Google) Deposition, p. 407 (“Q. So unknown sources in C-0-6 excludes Google Play and any preloaded store preloaded by an OEM? A. The design on Android for installation involves preloaded apps that the OEM might choose to allow to have a permission called install packages. That is the capability that is used by – typically used by preloaded stores. By contrast, installed sources, be that browsers, file managers, user installed, third-party stores app, have not been granted that capability by OEMs and they are considered to be unknown sources.”).

<sup>219</sup> Samsung, “Galaxy phone or tablet won’t install apps from unknown sources,” available at <https://www.samsung.com/us/support/troubleshooting/TSG01001353/> (“By default, your Galaxy phone or tablet is set to prohibit apps from being installed from sources other than the Play Store and Galaxy Store. However, you can change this setting if desired.”).

Compliance with the CDD and CTS is a condition to licensing the GMS suite of apps under the Mobile Application Distribution Agreement (“MADA”) described in IV.B.4.<sup>220</sup>

##### 5. *Revenue Sharing Agreement (“RSA”)*

97. Google has also entered into Revenue Sharing Agreements, sometimes referred to as Mobile Incentive Agreements with MNOs (*i.e.*, mobile carriers) and OEMs.<sup>221</sup>

98. Initially, Google executed RSAs with MNOs.<sup>222</sup> Google executed its first revenue sharing agreement with T-Mobile in collaboration on the launch of the first Android smart mobile device, the G1.<sup>223</sup> With the launch of paid transactions on Android Market (for paid apps, as paid in-app content was a later innovation<sup>224</sup>), Google agreed to give 70% of the consumer spend to developers, 25% to T-Mobile, and keep 5% for itself to attempt to cover payment processing

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<sup>220</sup> See, e.g., Google, “HTC MADA (Nov. 1, 2017 – Oct. 1, 2019 term),” November 1, 2017, GOOG-PLAY-009640439-467, at 445 (“[S]ubject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term”); Rosenberg (Google) Deposition, pp. 188-189 (“Q. Now if an OEM wants to install Google apps, then the OEM is required to meet additional compatibility requirements defined by Google, right? A. Yes, that’s correct. Q. And they are outlined in the Google Compatibility Definition Document, sometimes referred to as CDD? A. Yes, the CDD defines compatibility.”); Android 12, “Compatibility Definition,” at § 10.1, available at <https://source.android.com/docs/compatibility/android-cdd.pdf>; and Google, “Android 101,” GOOG-PLAY-000128863.R-908.R, at 877.R.

<sup>221</sup> Li (DOJ) Deposition, p. 199 (“Q. How does an M[IA] differ from an RSA? ... [Y]our response to that question was: In spirit there is no difference. We just named that first line at the top of the document ... A. I don’t recall that exact line, but I’m happy to go with that”). Jamie Rosenberg, Vice President of strategy for platforms and ecosystems at Google, explained that it enters revenue share agreements with carriers when they own the “client ID” for a phone, where “[t]he client ID is an identifier that goes on a device that says this is a device that qualifies for revenue share and...there can only be [one] owner of a client ID for a given device. That can be a carrier. It can be an OEM.” In the U.S., “the carriers do a lot of specifying in terms of what they want on devices, in almost all cases the carriers own the client ID.” He continues to explain that in Europe and Japan, for example, “not all devices are sold through carriers,” in which case “the OEM might retain the client ID.” See Google, “Deposition of Jamie Rosenberg in the Matter of: In Re – Google Antitrust Litigation,” July 14, 2020, GOOG-PLAY-007847148-353, at 273-277.

<sup>222</sup> [REDACTED]

<sup>223</sup> [REDACTED]

<sup>224</sup> Android Developers Blog, “In-app Billing Launched on Android Market,” March 29, 2011, available at <https://android-developers.googleblog.com/2011/03/in-app-billing-launched-on-android.html>.

transaction costs.<sup>225</sup> Eventually, Google offered the same 25% revenue sharing terms to other MNOs.<sup>226</sup> This in time expanded to include a share of revenue from the sale of in-app content.<sup>227</sup> Then, as of at least Q1 2013, Google began negotiating existing carrier revenue share deals to eliminate carrier revenue from the sale of apps and in-app content on Google Play, giving carriers a share of revenue only for purchases made through direct carrier billing.<sup>228</sup> Eventually, Google's negotiations eliminated revenue sharing with carriers, apart from limited revenue sharing for Direct Carrier Billing transactions in some jurisdictions.<sup>229</sup> See Exhibit 15 below, depicting this "Change in Play terms."

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<sup>225</sup> Email from Nick Sears, Google, to David Conway, Google, "Subject: Rev Share for Android Market," February 11, 2009, GOOG-PLAY-005559853-854, at 853 (updating on negotiations over "70/25/5% split on Android Market Revenue share").

<sup>226</sup> See, e.g., PX1084, "Carrier Rev-Share Evaluation," October 2012, GOOG-PLAY-003772918.R, at 920.R, 924.R.

<sup>227</sup> Android Market / Google Play did not always offer in-app billing. See Brady (Google) Deposition, p. 467 ("Q. And at the time that Android Market launched, was there a capability within Android Market for the payment processing of purchases of in-app content? A. No, I believe that capability was added later."); Chu (Meta Platforms (formerly Google)) Deposition, p. 108 ("Q. But it was added sometime after the market launched, correct? A. It was added sometime after, yes."). After in-app billing launched, the carrier rev share extended to in-app digital content purchases. See also, Email from Eric Chu to John Lagerling, March 9, 2011, GOOG-PLAY-005668326, at 326 ("Revenue share needs to stay the same. Subscription is just a form of In-app billing and we're staying with the current revenue share.").

<sup>228</sup> Email from Cristina Bitu, Google, to Patrick Pichette, Google, Jonathan Gold, Finance Manager for Android at Google, and Tim Riitters, Google, "Subject: Re: Play Revenue," May 7, 2013, GOOG-PLAY-003741416-420, at 417-418.

<sup>229</sup> See, e.g., Google, "Android Partnerships Strategy Rethink[:] Project Kick-off Discussion," May 6, 2015, GOOG-PLAY-001184813-857, at 823 (stating that Google pays carriers "15% of DCB related consumer App spend" but previously paid 27% of DCB). See also GOOG-PLAY4-004677224-229, at 225.

**Exhibit 15**  
**Google Reduced Revenue Share with MNOs**

Change in Play terms		
Transaction Type	Old Terms	New Terms
Apps Credit Card	25%	0%
Apps DCB	27%	15%
Content Credit Card	0%	0%
Content DCB	7%	6%

*Source:* Email from Cristina Bitu, Google, to Patrick Pichette, Google, Jonathan Gold, Finance Manager for Android at Google, and Tim Riitters, Google, “Subject: Re: Play Revenue,” May 7, 2013, GOOG-PLAY-003741416-420, at 418.

99. In 2013, Google began reducing the percentage of revenue it shared with MNOs, eventually eliminating any payments to mobile carriers. For example, [REDACTED]

[REDACTED] itself.<sup>230</sup> Google ended revenue share payments from credit card purchases in the Google Play Store to Sprint and T-Mobile as of 2014.<sup>231</sup> [REDACTED]

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<sup>231</sup> See Google, “Google Play Carrier Billing Agreement (Google Play For Mobile Operators),” 2013, GP MDL-TMO-0001831-848, at 838 and 847; and Google, “Android Search and Google Play Revenue Share Agreement For Mobile Operators,” 2013, GP MDL-TMO-0002071-098, at 094.

101. Eventually, Google began entering RSAs with OEMs that secured, among other things, exclusivity for Google Play against competing apps that the OEM could preload.<sup>234</sup> To that end, in 2019, Google introduced the Google Distribution on Android Framework, a stock set of RSA terms for OEMs also known as the RSA 3.0.<sup>235</sup> The RSA 3.0 has three tiers of revenue sharing with Google for mobile devices – Premier, Optimized, and Basic – each of which entitles the OEM to a certain percentage of Net Play Transaction Revenue and Net Ad Revenue: Basic devices qualify for 10% of Net Ad Revenue at one end, while Premier devices qualify for [REDACTED] of Net Ad Revenue and up to [REDACTED] of Net Play Revenue at the other.<sup>236</sup> For Premier tier devices,

<sup>236</sup> Google, “Google Mobile Revenue Share Agreement 2020,” Google-HMD, GOOG-PLAY-000620282-321, at 305 (up to [REDACTED] of Net Play Revenue); Google-Xiaomi RSA, GOOG-PLAY-000620210, at 235 (“Google will pay Company [REDACTED] of Net Play Transaction Revenue generated from Play Transactions on Premier Devices . . .”). .

[REDACTED].<sup>237</sup> Besides exclusivity for Google Play, the RSA 3.0 has anti-steering provisions that prohibit OEMs from advertising to users any alternative to Google Play:<sup>238</sup>

[REDACTED]

102. The RSA 3.0 also requires that the Google Play app icon on Premier devices is “placed on the Default Home Screen and [that the] Google Play app is set as [the] default

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<sup>237</sup> RSA 3.0 agreements themselves require compliance with the Premier Device Program Requirements Document. *See* “Premier Device Program Requirements Document,” February 7, 2020, GOOG-PLAY-006390054. *See also* Kolotouros (Google) Deposition, pp. 338-339 (“Q. Does that lead you to believe that this is, in fact, a set of requirements that applies across all RSAs for Premier tier devices? A. To the extent that the revenue share agreements reference this URL, that would be correct, yes.”); Google, “Premier Tier Requirements,” July 31, 2021, GOOG-PLAY-007125883-889, at 886 (requiring that application preloads “MUST NOT overlap with the following Google preloads in terms of the applications, features, or functionality: Chrome Browser, Contacts, Duo, Gboard, Gmail, Google Assistant, Google Calendar, Google Discovery, Google Lens, Google News, Google One, Google Pay, Google Photos, Google Play, Google Podcasts, Google Search app, Messages and Phone (Dialer)” and “MUST NOT contain INSTALL\_PACKAGES permissions.”) and 887 (“1P installers and 3P engines powering 1P installers are not allowed without Google’s prior review and approval” and “MUST comply with” a list of requirements, including that its pre-installation “[s]hould not change preset icon layouts” or “promote Alternative Services”).

<sup>238</sup> Google, “Google Mobile Revenue Share Agreement 2020,” 2019, GOOG-PLAY-000620282-321, at 292 (emphasis added).

marketplace for applications, games, books, movies, music, and all other digital content (including subscriptions).”<sup>239</sup> The RSAs also mandate compliance with the MADA.<sup>240</sup>

#### 6. *Google Play Developer Distribution Agreement (“DDA”)*

103. To distribute apps on the Google Play Store, a developer must have a Google Play Developer Account, pay a registration fee of \$25, and comply with the Developer Distribution Agreement (“DDA”), Google’s Developer Program Policies, and related policies.<sup>241</sup> The DDA states that developers “may not use Google Play to distribute or make available any Product that has a purpose that facilitates the distribution of software applications and games for use on Android devices outside of Google Play.”<sup>242</sup> The DDA in turn requires developers to comply with the Developer Program Policy, which states that “an app may not download executable code (e.g., dex, JAR, .so files) from a source other than Google Play.”<sup>243</sup>

104. The DDA and related policies also require the developer to use Google Play Billing as the billing solutions provider for app downloads and in-app purchases.<sup>244</sup> The DDA requires developers to “have a valid Payment Account under a separate agreement with a [Google] Payment

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<sup>239</sup> Google, “Google Mobile Revenue Share Agreement 2020,” 2019, GOOG-PLAY-000620282-321, at 310.

<sup>240</sup> Google, “Google Mobile Revenue Share Agreement 2020,” 2019, GOOG-PLAY-000620282-321, at 295. (“7.1 MADA and EMADA. Company is a party to a valid and effective MADA and, for Devices distributed in the EEA, a valid and effective EMADA; and Company will at all times during the Term remain in compliance with the MADA, and, for Devices distributed in the EEA, the EMADA.”).

<sup>241</sup> Google, “How to use Play Console,” available at <https://support.google.com/googleplay/android-developer/answer/6112435?hl=en-GB>. *See also* Google, “Policy Centre,” available at <https://support.google.com/googleplay/android-developer/topic/9858052#zippy=>.

<sup>242</sup> Google, “Google Play Developer Distribution Agreement,” (hereafter “Google Play DDA”), § 4.5, November 17, 2020, GOOG-PLAY-000053875-878, at 875, available at <https://play.google.com/about/developer-distribution-agreement.html>.

<sup>243</sup> “Developer Program Policy,” effective September 28, 2022, available at [https://support.google.com/googleplay/android-developer/answer/12766072?visit\\_id=638004251869883965-3060563484&rd=1](https://support.google.com/googleplay/android-developer/answer/12766072?visit_id=638004251869883965-3060563484&rd=1).

<sup>244</sup> *See* Google, “Google Play Payments Policy,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>, §§ 1-2 (Google also requires app developers to comply with its payment policy, where “any apps existing as of 20 September 2020 that used an alternative in-app billing system needed to remove it as of 30 September 2021 to be in compliance[.]” However, it allows extensions to developers and evaluates such requests “on an app-by-app basis with a latest possible date of compliance of 31 March 2022.”). *See also* Google, “Understanding Google Play’s Payments policy,” available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en>.



Processor” in order to “charge a fee” for digital in-app content.<sup>245</sup> Further, the Developer Program Policy states that developers “Play-distributed apps requiring or accepting payment for access to in-app features or services, including any app functionality, digital content or goods (collectively “in-app purchases”), must use Google Play’s billing system for those transactions.”<sup>246</sup> By way of example, Google requires consumers to use Google Play Billing to purchase digital items (“such as virtual currencies, extra lives, additional playtime, add-on items, characters and avatars”), subscription services (“such as fitness, game, dating, education, music, video, service upgrades and other content subscription services”), app functionality or content (“such as an ad-free version of an app or new features not available in the free version”), and cloud software and services (“such as data storage services, business productivity software, and financial management software”).<sup>247</sup> Moreover, Google generally prohibits developers from leading users to “a payment method other than Google Play’s billing system” for in-app purchases of digital content (*e.g.*, by embedding a direct link to the developers’ website containing an alternative payment method).<sup>248,249</sup>

105. By contrast, Google does not require developers to use Google Play Billing for the purchase of physical goods and services consumed outside the app, payments of credit card bills or utility bills, peer-to-peer transactions, payments related to online auctions, tax exempt donations,

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<sup>245</sup> Google Play DDA, § 3.2.

<sup>246</sup> “Developer Program Policy,” effective September 28, 2022, available at [https://support.google.com/googleplay/android-developer/answer/12766072?visit\\_id=638004251869883965-3060563484&rd=1](https://support.google.com/googleplay/android-developer/answer/12766072?visit_id=638004251869883965-3060563484&rd=1)

<sup>247</sup> Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738?hl=en>.

<sup>248</sup> *See* Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738?hl=en>, § 4.

<sup>249</sup> In March 2022, Google announced a pilot program to allow non-game Android apps to use their own payment system if they also offered Google Play Billing as an option, and Spotify was the inaugural “User Choice Billing” partner. In September 2022, Google opened the User Choice Billing pilot to non-game developers in the European Economic Area, Australia, India, Indonesia, and Japan. *See* Samat, Sameer, “Exploring User Choice Billing With First Innovation Partner Spotify,” March 23, 2022, available at <https://android-developers.googleblog.com/2022/03/user-choice-billing.html> (“This pilot will allow a small number of participating developers to offer an additional billing option next to Google Play’s billing system and is designed to help us explore ways to offer this choice to users, while maintaining our ability to invest in the ecosystem. This is a significant milestone and the first on any major app store — whether on mobile, desktop, or game consoles.”); Play Console Help, “Enrolling in the user choice billing pilot,” available at <https://support.google.com/googleplay/android-developer/answer/12570971>; Li, Abner, “Google Play opens developer sign-ups for third-party ‘User Choice Billing,’” *9to5Google*, September 1, 2022, available at <https://9to5google.com/2022/09/01/google-play-user-billing-sign-up/>.



and payments that facilitate online gambling.<sup>250</sup> In fact, Google requires that payments related to those activities “must not” be processed on Google’s own IAP system.<sup>251</sup> In addition, Google allows developers to offer a “consumption only” app where users can access content that has been paid somewhere else; in this instance, there are no payment options within the app and developers may not provide information to users to pay outside the app.<sup>252</sup>

106. The developer has the “sole discretion” to set prices for apps it publishes in Google Play and the in-app content within such apps.<sup>253</sup> The DDA does limit pricing in that the developer agrees that any products “that were initially offered free of charge to users will remain free of charge” and “[a]ny additional charges will correlate with an alternative or supplemental version of the Product.”<sup>254</sup> Google “may give refunds for some Google Play purchases” within 48 hours of the app or in-app purchase,<sup>255</sup> and the DDA gives Google the power to make those refunds by deducting the refund amount from the developer’s revenue share payments.<sup>256</sup> Outside that window, the DDA specifies that the developer “will be solely responsible, and Google will have no responsibility, for undertaking or handling the support and maintenance” of the developer’s apps or in-app content “and any complaints” from customers.<sup>257</sup> The DDA further commits the developer to “respond to customer support inquiries [for paid products or in-app transactions] within 3

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<sup>250</sup> Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>, at § 3.

<sup>251</sup> See Google, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>, at § 3.

<sup>252</sup> See, e.g., Google, “Understanding Google Play’s payments policy – Frequently asked questions,” available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en-GB#zippy=%2Ccan-i-offer-a-consumption-only-reader-app-on-google-play>. (“Google Play allows any app to be consumption-only, even if it is part of a paid service. For example, a user could log in when the app opens and access content paid for somewhere else.”)

<sup>253</sup> Google Play DDA, at § 3.3 (“Products are displayed to users at prices You establish in Your sole discretion.”).

<sup>254</sup> Google Play DDA, at § 3.7.

<sup>255</sup> Google, “Learn about refunds on Google Play,” available at <https://support.google.com/googleplay/answer/2479637?hl=en#:~:text=If%20you%20haven%27t%20started,65%20days%20of%20your%20purchase>.

<sup>256</sup> Google Play DDA, at § 3.8 (“You authorize Google to give users refunds in accordance with the Google Play refund policies as located here or the local versions made available to You, and You agree that Google may deduct the amount of those refunds from payments to you.”).

<sup>257</sup> Google Play DDA, at § 4.7.

business days, and within 24 hours to any support or Product concerns stated to be urgent by Google.”<sup>258</sup>

## 7. *Google Reduced Commission Developer Programs and Agreements*

107. Google historically took 30% of the app price or in-app purchase price as its own revenue (setting aside carrier payments) and remitted the remaining 70% of consumer spending to developers.<sup>259</sup> In recent years, Google made some limited changes to its 30% commission. For example, beginning on January 1, 2018, for automatically renewing subscription products, Google lowered its commission to 15% beginning in year two of the subscription.<sup>260</sup> On July 1, 2021, Google lowered its commission from 30% to 15% on the first \$1 million in a developer’s consumer spending.<sup>261</sup> On January 1, 2022, Google then lowered the commission on the first year in in-app subscriptions to 15% from 30%.<sup>262</sup> Google has also offered reductions on these general terms, providing some reduced commissions as part of special developer programs or in on-on-one deals with certain developers. Exhibit 16 below depicts various reduced commission programs and

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<sup>258</sup> Google Play DDA, at § 4.7.

<sup>259</sup> See Google, “Transaction fees for merchants,” available at <https://web.archive.org/web/20220305213757/https://support.google.com/paymentscenter/answer/7159343?hl=en>. See also Rasanen (Google) Deposition, p. 227 (“Q. And specifically, when you refer to ‘rev share,’ you refer to the 30 percent service fee that Google charges – was charging at this time for transactions processed by Google Play Billing? A. That’s correct”); and Email from Jon Gold, Google, to Cristina Bitu, Google, “Subject: Re: Play revenue,” May 8, 2013, GOOG-PLAY-003741416, at -417 (“Gross Revenue for Apps is defined as: Cons. Spend [minus] Developer Share (70%)”).

<sup>260</sup> Statt, Nick, “Google matches Apple by reducing Play Store fee for Android app subscriptions,” *The Verge*, October 19, 2017, available at <https://www.theverge.com/2017/10/19/16502152/google-play-store-android-apple-app-store-subscription-revenue-cut> and Buch, Vineet, “Playtime 2017: Find success on Google Play and grow your business with new Play Console features,” *Google*, October 19, 2017, available at <https://android-developers.googleblog.com/2017/10/playtime-2017-find-success-on-google.html> (“Finally, from January 2018 we’re also updating our transaction fee for subscribers who are retained for more than 12 months”).

<sup>261</sup> Samat, Sameer, “Boosting developer success on Google Play,” *Android Developers Blog*, March 16, 2021, available at <https://android-developers.googleblog.com/2021/03/boosting-dev-success.html> (“Starting on July 1, 2021 we are reducing the service fee Google Play receives when a developer sells digital goods or services to 15% for the first \$1M (USD) of revenue every developer earns each year”).

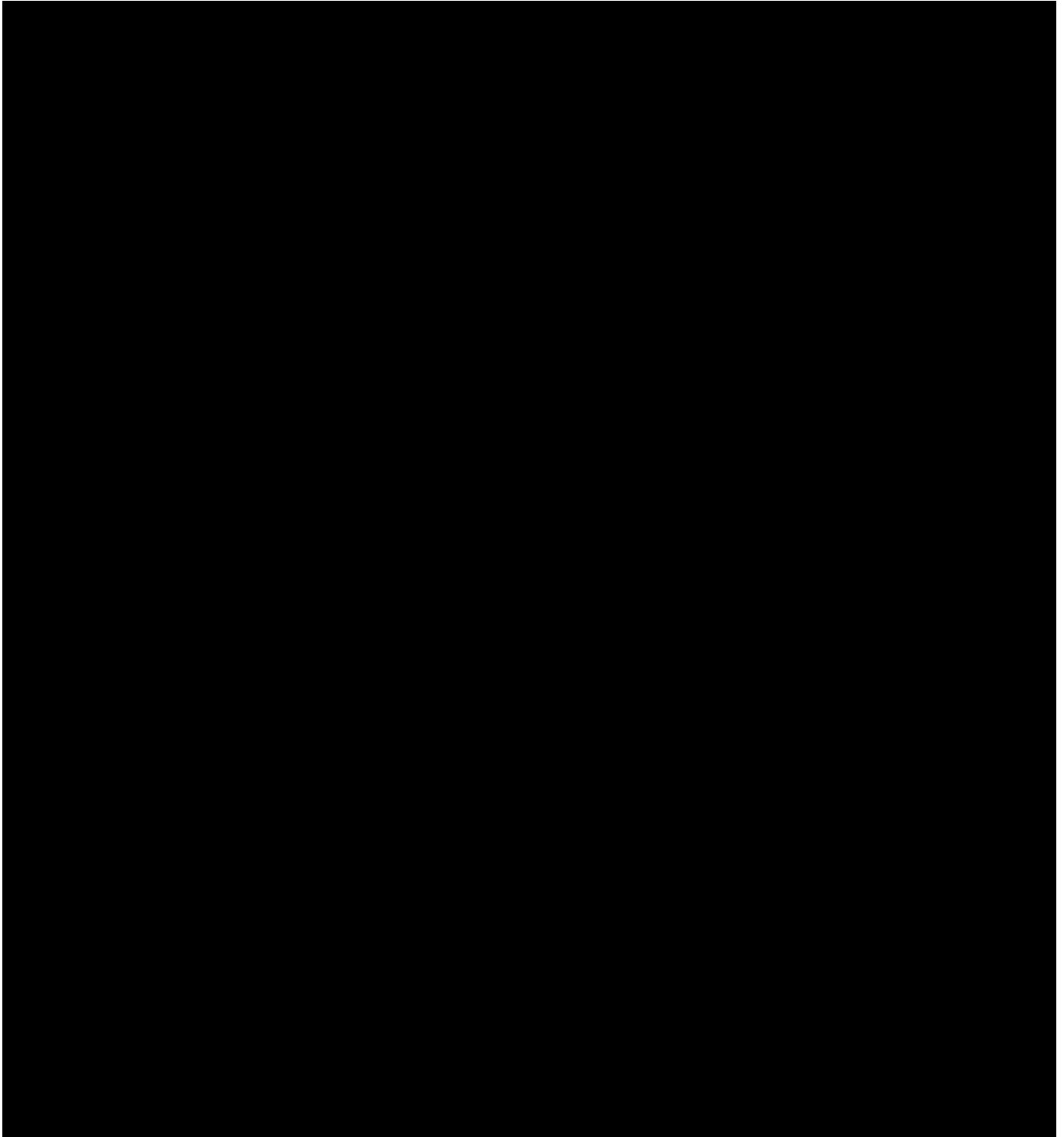
<sup>262</sup> Samat, Sameer, “Evolving our business model to address developer needs,” *Android Developers Blog*, October 21, 2021, available at <https://android-developers.googleblog.com/2021/10/evolving-business-model.html> (“To help support the specific needs of developers offering subscriptions, starting on January 1, 2022, we’re decreasing the service fee for all subscriptions on Google Play from 30% to 15%, starting from day one”).

special deal agreements that Google has offered and entered into with developers, for which I was able to find information in the record.<sup>263</sup>

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<sup>263</sup> Additional information on these programs and offers in Section VII.B.1 and Appendix E.

**Exhibit 16**



108. Notably, Google documents and witness testimony indicates these special deals were aimed at inhibiting third-party app distribution and retaining (or attracting) developers in Google

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Play Billing. For example, Exhibit 17 below depicts a Google document highlighting programs targeted at app developers, such as Project Hug, Magical Bridge, and Project Agave, which were part of a multi-faceted approach to [REDACTED] and inhibit the [REDACTED].”<sup>264</sup> Further, Lawrence Koh, former Director and Global Head of Games Business Development at Google, testified that Google’s investment in the app developer Riot was necessary to ensure that Riot chose Play instead of launching their own Android store.<sup>265</sup> Google apparently believed its efforts aimed at developers would limit the Samsung Galaxy Store’s ability to offer [REDACTED] and, thus, limit off-Play distribution.<sup>266</sup>

### **Exhibit 17**

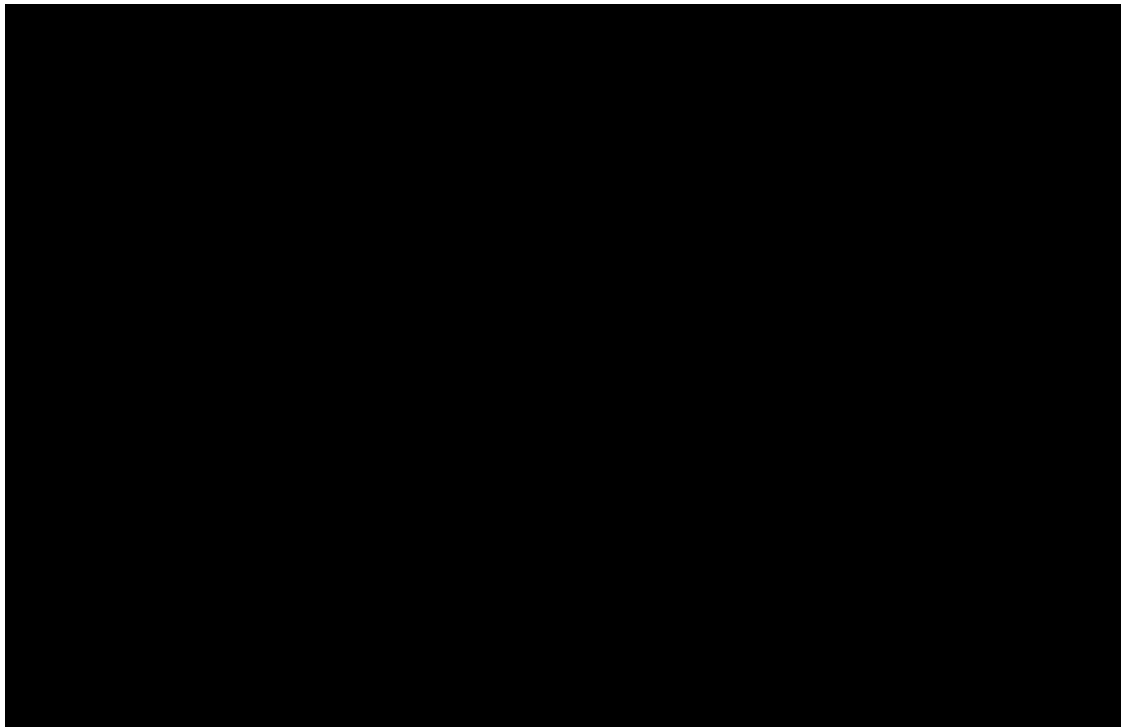
#### **Google had Multiple Projects Aimed at Preventing Third-Party Android App Distribution**

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<sup>264</sup> Google, “Business Model / Policy,” GOOG-PLAY-004502766.R-771.R, at 769.R.

<sup>265</sup> Email from George Yousling, Google, to Lawrence Koh, former Director and Global Head of Games Business Development at Google, “Subject: Re: <Action Needed> Riot & GVP,” February 18, 2020, GOOG-PLAY-000928690-692, at 691. *See also* Koh (EA (formerly Google)) Deposition, pp. 13-21 (“Q. And your view was that objective number 1, making sure Riot did not launch their own Android app store, that Google was paying a higher premium in the first year as Riot builds up their business, and that that was an investment that was well -- money well spent? ... THE WITNESS: Yes, that is correct”).

<sup>266</sup> Google, “Project Banyan FAQs [WIP TO BE REFINED],” GOOG-PLAY-000464148-153, at 151.



*Source:* Google, “Business Model / Policy,” GOOG-PLAY-004502766.R-771.R, at 769.R.

109. One program noted in Exhibit 17 is Project Hug, also known as the Games Velocity Program.<sup>267</sup> Launched in 2018, Project Hug was an incentive program with top app developers that, Google determined, were most at risk of abandoning the Google Play Store for alternative means of distributing their apps.<sup>268</sup> Under Project Hug, Google targeted 21 top game developers,

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<sup>267</sup> Marchak (Google) Deposition, pp. 257-258; GOOG-PLAY-006998204.R-211.R, at 206.R.

<sup>268</sup> Email from Samer Sayigh, Google, to Lei Zhang, Google, and Mike Marchak, Director of Play Partnerships, Strategy and Operations for Google, “Subject: Re: [Bear Hug] Plan for October,” October 9, 2018, GOOG-PLAY-004595170-172, at 170-171; Google, Untitled, GOOG-PLAY-000237792-797, at 792-793; 795-797; Marchak (Google) Deposition, pp. 70, 257. *See also* Google, “Games Velocity Program,” December 2020, GOOG-PLAY-004146689.R-757.R, at 692.R-695.R and 709.R-713.R; and Marchak (Google) Deposition, pp. 380-382 (“Q How do you understand the four bullet points on the right side? What are they meant to depict? A It seems like they are describing the developers on the left. ... Q Okay. And one of the characteristics is that the developers may forego Play; correct? A That is one of the characteristics on the slide. Q And one of the characteristics under that is that these developers may have the capabilities to go it alone on Android; correct? A That's one of the three characteristics on the slide. Q And by "go it alone," is it fair to say that you understand Mr. Gambhir to mean that they could distribute their games outside of Google Play; correct? ... THE WITNESS: My understanding is all developers could distribute their games outside of Google Play. There's multiple app stores in sideloading. I believe when the bullet on capabilities references, you know, some -- that they've already established some infrastructure or something like that to do it. BY MR. EVEN: Q Okay. So then -- A Or a propensity or something like that. But I look at it all developers have the capability to go it alone on Android. Q But these were, as you say, some propensity to actually go through with it? ... THE WITNESS: Something like that where they've invested already or had some characteristics that aligned with that”).

which accounted for approximately [REDACTED] of total consumer spend on the Google Play Store.<sup>269</sup>

Google offered developers [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].<sup>271</sup>

110. Google notes that enforcement of its policies and 30% commission could encourage developers to “offer web payment only and possibly increase prices on Android,” and considered revenue share agreements with targeted developers, reducing its 30% commission to these developers.<sup>272</sup> At the same time, Google planned to limit the number of developers in the program and noted the risk of “contagion” if other developers found out about Project Hug benefits and requested “increased support.”<sup>273</sup> Another special program noted in Exhibit 17 above was Project Agave (previously Project Banyan), a proposal to Samsung, including product and commercial offers, to deter the Galaxy store from competing with Google Play Store.<sup>274</sup> The goal of the

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<sup>269</sup> Google, “Games Velocity Program,” December 2020, GOOG-PLAY-004146689.R-757.R, at 694.R; Marchak (Google) Deposition, pp. 379-381. A 2019 Google internal email indicates there were 22 developers targeted. *See* Email from Purnima Kochikar, Google, to James Kolotouros, Vice President, Android Platform Partnerships, for Google, “Subject: Re: Banyan,” June 12, 2019, GOOG-PLAY-001877016.C-022.C, at 019.C (“Hug provides terms to prevent Samsung exclusives for the most lucrative and risky devs (22 currently)”).

<sup>270</sup> PX1577, “Games Velocity Program (GVP) Accounting Memo,” (Aug. 18, 2021), GOOG-PLAY-011271413-442, at -414.

<sup>271</sup> *See, e.g.*, Google and Activision, “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” January 25, 2020, GOOG-PLAY-007273439-444, at § 3.A, B.

<sup>272</sup> Google, “Play Payments Policy Update Analysis,” GOOG-PLAY-000566853-914, at 863 (noting that “[i]f policy starts to be enforced under current terms (30%), developers are likely to offer web payment only and possibly increase prices on Android.” As a solution, Google document proposes “[requiring] developers to use Play billing with lower revShare even for Inapp purchases or make explicit exception for selling of music, books, magazines, and videos.”).

<sup>273</sup> Google, “Boosting Top Game Developer Support & Securing Play Distribution on Samsung Devices,” April 9, 2019, GOOG-PLAY-003332817.R-864.R, at 839.R.

<sup>274</sup> Rosenberg (Google) Deposition, pp. 99, 110-111, and 152 (“Project Banyan was a potential collaboration with Samsung that would kind of streamline the app discovery experience for users and the app distribution experience for

proposal was to “Prevent unnecessary competition on store,” by [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED].<sup>276</sup> As an incentive for Samsung to agree to these terms, Google offered Samsung a revenue share of [REDACTED] on Google’s revenue generated from the Galaxy Store, plus a [REDACTED]

[REDACTED].<sup>277</sup>

111. Exhibit 17 also identifies Magical Bridge as a special program targeted at developers in response to [REDACTED]. In 2019, Google’s Magical Bridge project was designed to [REDACTED]<sup>278</sup> to determine how to [REDACTED]

[REDACTED]<sup>279</sup>

112. Additional information on other Google special programs and offers listed in Exhibit 16 above is included in Section VII.B.1 below.

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developers. So it would -- it would be creating a single flow for developers into Play that would host the apps available to users on Samsung devices. Samsung could still maintain a storefront or some sort of user interface where they would promote those apps. Those apps would be hosted and delivered by Play and we would -- we would build -- basically we would build special tech to try and create this new product with Samsung. [...] [W]hatever Samsung decided to do with the Galaxy Store, whatever, if they were promoting apps, whatever experience they were creating, the fulfillment of those apps would be handled by the Play Store back end.”) and Google, “Google-Samsung Store Agreement Term Sheet,” June 20, 2019, GOOG-PLAY4-004259430-432, at 430.

<sup>275</sup> Google, “Google-Samsung Store Agreement Term Sheet,” June 20, 2019, GOOG-PLAY4-004259430-432, at 430.

<sup>276</sup> Google, “Google-Samsung Store Agreement Term Sheet,” June 20, 2019, GOOG-PLAY4-004259430-432, at 431.

<sup>277</sup> Google, “Google-Samsung Store Agreement Term Sheet,” June 20, 2019, GOOG-PLAY4-004259430-432, at 432.

<sup>278</sup> Marchak (Google) Deposition, p. 105. *See also* Google, “Magical Bridge – Potential Developer POV,” June 2019, GOOG-PLAY-003938581.R-614.R, at 594.R.

<sup>279</sup> Email from Wendy-Kay Logan, Google, to Mike Marchak, Director of Play Partnerships, Strategy and Operations for Google, “Subject: Re: Recap of sync with Sameer,” August 2, 2019, GOOG-PLAY-001214798-799, at 798.



### C. Overview of the Challenged Conduct

113. The States allege Google has monopolized the Android App Distribution Market and tied Google Play Billing to Android App Distribution through the Google Play Store (“Google’s challenged conduct”). The States’ Amended Complaint addresses several aspects of Google’s conduct, including:

- The CDD’s requirement for OEMs to create an “unknown sources” dialog box for app installations from sources besides Google Play or app store that have been pre-loaded onto the device that bypass that permission;<sup>280</sup>
- The MADA requirement that OEMs preload the Play Store icon on the default home screen;<sup>281</sup>
- The bundling of Google Play with more than 10 GMS apps including YouTube, Google Maps, and Gmail, and associated key APIs under the MADA;<sup>282</sup>
- Google’s exclusive dealing or “no duplication of services” clauses in RSAs and elsewhere prohibiting MNOs or OEMs from pre-loading third-party app stores on their smart mobile devices in exchange for a share of revenue from Google Play;<sup>283</sup>
- Google’s refusal to publish competing app stores on Google Play;<sup>284</sup>
- Google’s incentive payments to developers in exchange for contractual commitment not to launch exclusive titles on competing app stores;<sup>285</sup>
- Google’s tie of Google Play with Google Play Billing for in-app billing services;<sup>286</sup> and

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<sup>280</sup> First Amended Complaint, ¶¶ 83-106. *See* Cunningham (Google) Deposition, p. 407 (“Q. So unknown sources in C-0-6 excludes Google Play and any preloaded store preloaded by an OEM? A. The design on Android for installation involves preloaded apps that the OEM might choose to allow to have a permission called install packages. That is the capability that is used by – typically used by preloaded stores. By contrast, installed sources, be that browsers, file managers, user installed, third-party stores app, have not been granted that capability by OEMs and they are considered to be unknown sources.”).

<sup>281</sup> First Amended Complaint, ¶¶ 124-27.

<sup>282</sup> First Amended Complaint, ¶¶ 116-123 and 128-29.

<sup>283</sup> First Amended Complaint, ¶¶ 130-135; Brady (Google) Deposition, p. 119.

<sup>284</sup> First Amended Complaint, ¶¶ 107-110.

<sup>285</sup> First Amended Complaint, ¶¶ 135, 139, and 147-48.

<sup>286</sup> First Amended Complaint, ¶¶ 161-228.

- Google’s anti-steering rules prohibiting developers from advertising lower commission fees outside of Google Play in their apps.<sup>287</sup>

114. To assess this conduct, I begin with market definition.

## V. Market Definition

### A. Antitrust Principles of Market Definition

#### 1. Basics of Market Definition

115. Market definition is a standard antitrust framework for identifying the boundaries of competition relevant to anticompetitive conduct.<sup>288</sup> However, market definition is just the first step in measuring market power and assessing anticompetitive conduct. As noted in the *U.S. Merger Guidelines* jointly published by the U.S. Department of Justice and the Federal Trade Commission, “[t]he measurement of market shares and market concentration is not an end in itself, but is useful to the extent it illuminates...competitive effects.”<sup>289</sup> This view is supported by the UK’s Office of Fair Trading (the CMA’s predecessor):

Market definition is not an end in itself but a key step in identifying the competitive constraints acting on a supplier of a given product or service. Market definition provides a framework for competition analysis. For example, market shares can be calculated only after the market has been defined and, when considering the potential for new entry, it is

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<sup>287</sup> First Amended Complaint, ¶ 202.

<sup>288</sup> See *U.S. Merger Guidelines*, at § 4 (“When the Agencies identify a potential competitive concern with a horizontal merger, market definition plays two roles. First, market definition helps specify the line of commerce and section of the country in which the competitive concern arises. In any merger enforcement action, the Agencies will normally identify one or more relevant markets in which the merger may substantially lessen competition. Second, market definition allows the Agencies to identify market participants and measure market shares and market concentration.”). See also European Commission, “Commission Notice on the definition of relevant market for the purposes of Community competition law,” *Official Journal of the European Communities*, Vol. 40, 1997, pp 5-13, available at [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997Y1209\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997Y1209(01)&from=EN) (hereafter “Commission Notice”), at ¶ 2 (“Market definition is a tool to identify and define the boundaries of competition between firms. It serves to establish the framework within which competition policy is applied by the Commission. The main purpose of market definition is to identify in a systematic way the competitive constraints that the undertakings involved face. The objective of defining a market in both its product and geographic dimension is to identify those actual competitors of the undertakings involved that are capable of constraining those undertakings’ behaviour and of preventing them from behaving independently of effective competitive pressure.”).

<sup>289</sup> *U.S. Merger Guidelines*, § 4.

necessary to identify the market that might be entered. Market definition is usually the first step in the assessment of market power.<sup>290</sup>

116. The economics literature recognizes that “[m]arket definition is least useful when market shares would not be strongly probative of market power or anticompetitive effect, while direct evidence as to market power or anticompetitive effect is available and convincing.”<sup>291</sup> Indeed, though defining a relevant market is a common first step in assessing conduct, it is not a necessary step in determining whether a firm has market power.<sup>292</sup>

117. Market definition typically centers on demand-side substitution, evaluating the reasonably interchangeable choices available to consumers, such that they would form a relevant antitrust market.<sup>293</sup> That is, demand-side substitution is the extent to which consumers of a product sold by one firm (Product A) would substitute to a product sold by another firm (Product B) in response to a small but significant non-transitory increase in price (“SSNIP”) in Product A. The Hypothetical Monopolist Test (“HMT”) is a framework that can be used to define the boundaries of a relevant market. The HMT is summarized in the *U.S. Merger Guidelines*:<sup>294</sup>

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<sup>290</sup> See UK Office of Fair Trading, “Market Definition,” December 2004, available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/284423/oft403.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/284423/oft403.pdf).

<sup>291</sup> Baker, Jonathan B., “Market definition: An analytical overview,” *Antitrust LJ*, Vol 74, 2007, pp. 129-173, available at [https://heinonline.org/HOL/LandingPage?handle=hein.journals/antil74&div=8&id=&page=](https://heinonline.org/HOL/LandingPage?handle=hein.journals/antil74&div=8&id=&page=,), at p. 131.

<sup>292</sup> See, e.g., Baker, Jonathan B., and Timothy Bresnahan, “Economic Evidence in Antitrust - Defining Markets and Measuring Market Power,” in *Handbook of Antitrust Economics*, Ed. Paolo Buccirossi, Cambridge, MA: The MIT Press, 2008, pp. 1-43, at p. 3 (highlighting that “settings where the competitive effects of business conduct can be measured directly [are] settings where economists might find market definition unnecessary”); and Kaplow, Louis, “Why (Ever) Define Markets,” *Harvard Law Review*, Vol. 124, No. 2, December 2010, pp. 437-517, at p. 446 (arguing that “[T]he role of the market definition / market share paradigm is, on its face, obscure. Market shares, whether in a properly defined relevant market or in any other, do not appear in the definition of market power. Instead, one only sees price and marginal cost. It would seem that, if one wished to know the level of market power, one would, therefore, examine price and marginal cost.”).

<sup>293</sup> U.S. Merger Guidelines, § 4.

<sup>294</sup> *U.S. Merger Guidelines*, § 4.1.1. The European Commission takes a consistent approach to market definition: “The question to be answered is whether the parties’ customers would switch to readily available substitutes or to suppliers located elsewhere in response to a hypothetical small (in the range 5 % to 10 %) but permanent relative price increase in the products and areas being considered. If substitution were enough to make the price increase unprofitable because of the resulting loss of sales, additional substitutes and areas are included in the relevant market. This would be done until the set of products and geographical areas is such that small, permanent increases in relative prices would be profitable.” See Commission Notice, ¶ 17.

Specifically, the test requires that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future seller of those products (“hypothetical monopolist”) likely would impose at least a small but significant and non-transitory increase in price (“SSNIP”) on at least one product in the market, including at least one product sold by one of the merging firms. For the purpose of analyzing this issue, the terms of sale of products outside the candidate market are held constant.

118. Thus, the hypothetical monopolist framework (often measured through the above-defined SSNIP test) can estimate the substitution between two products to determine whether they are in the same relevant market. The *U.S. Merger Guidelines* further explain that “[g]roups of products may satisfy the [HMT] without including the full range of substitutes from which customers choose.”<sup>295</sup>

119. However, as described above, the HMT focuses on the “present and future” seller imposing a SSNIP; that is, it is not a backward-looking but a forward-looking analysis. In a merger context, authorities seek to understand the likely impact if a merged firm raised prices post-merger. By contrast, while the HMT can be applied in conduct cases where an analysis of the historical market is required,<sup>296</sup> the actual world has likely been affected by the alleged anticompetitive conduct, thereby increasing the chance the HMT and SSNIP will define a market that is too wide. This is because a profit-maximizing monopolist may have already increased the price to a point where even inferior goods (that would be outside a relevant market under competitive conditions) become substitutes (the so-called cellophane fallacy).<sup>297</sup> I consider the implications of the cellophane fallacy when implementing the HMT in Section V.C.5 below.

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<sup>295</sup> U.S. Merger Guidelines, § 4.1.1.

<sup>296</sup> There are numerous discussions on how historical evidence can be used to operate a HMT. See Harkrider, John and Axinn, Veltrop & Harkrider, LLP, “Operationalizing the hypothetical monopolist test,” *U.S. Department of Justice*, June 15, 2015, available at <https://www.justice.gov/atr/operationalizing-hypothetical-monopolist-test>.

<sup>297</sup> See “Appeal from the United States District Court for the District of Delaware,” *United States v. E.I. du Pont de Nemours & Co.*, Case No. 351 U.S. 377, 1956. The “Cellophane Fallacy” is where DuPont (the sole manufacturer of cellophane) had increased the price of cellophane to a point where other flexible wrapping materials became substitutes. DuPont tried to argue that this substitution / switching resulting from a SSNIP proved these inferior goods were in the market. But DuPont’s analysis did not conduct the SSNIP at the competitive level, not the prevailing (potentially anti-competitive) market price, and therefore risked defining the market as too wide.

120. To estimate consumers' likely response to a change in price, the *U.S. Merger Guidelines* permit considering "any reasonably available and reliable evidence" including:

- "how customers have shifted purchases in the past in response to relative changes in price or other terms and conditions;
- information from buyers, including surveys, concerning how they would respond to price changes;
- the conduct of industry participants, notably: sellers' business decisions or business documents indicating sellers' informed beliefs concerning how customers would substitute among products in response to relative changes in price; industry participants' behavior in tracking and responding to price changes by some or all rivals;
- objective information about product characteristics and the costs and delays of switching products, especially switching from products in the candidate market to products outside the candidate market[.]”<sup>298</sup>

121. The *U.S. Merger Guidelines* also note that:

Even when the evidence necessary to perform the hypothetical monopolist test quantitatively is not available, the conceptual framework of the test provides a useful methodological tool for gathering and analyzing evidence pertinent to customer substitution and to market definition. The Agencies follow the hypothetical monopolist test to the extent possible given the available evidence, bearing in mind that the ultimate goal of market definition is to help determine whether the merger may substantially lessen competition.<sup>299</sup>

Therefore, even if the precise quantitative evidence is not available for the HMT (or SSNIP test), the conceptual framework can be used to analyze the evidence on customer substitution and, thus, inform the boundaries of a relevant market.

122. In the sections that follow, I have been asked by counsel to evaluate qualitative factors to consider reasonably available and reliable evidence for evaluating the boundaries of the

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<sup>298</sup> U.S. Merger Guidelines, § 4.1.3.

<sup>299</sup> U.S. Merger Guidelines, § 4.1.3.

relevant markets. I cannot judge the truth or falsity of any documents or testimony. Rather, I evaluate the evidence available in this case to see whether explanations and observations from industry participants match the economic incentives that a dominant firm would have in the relevant product market. Where the qualitative evidence, on its face, is consistent with any quantitative analysis, I find that to be confirming evidence of the relevant markets.

123. Finally, the HMT can also evaluate competition from the supply side by accounting for the firms that reasonably could enter and compete in the relevant market if a hypothetical monopolist imposed a SSNIP. This concept is known as supply-side substitution. The *U.S. Merger Guidelines* note: “Firms that are not current producers in a relevant market, but that would very likely provide rapid supply responses with direct competitive impact in the event of a SSNIP, without incurring significant sunk costs, are also considered market participants.”<sup>300</sup> If suppliers can easily switch production of similar products to the focal product (without significant costs or risks), that may provide a sufficient constraint on the firm in question to limit its market power. These effects can therefore be similar in terms of effectiveness and immediacy to the demand-side substitution effect.<sup>301</sup>

## 2. *Market Definition and Two-Sided Markets*

124. A two-sided market is, broadly speaking, “one in which 1) two sets of agents interact through an intermediary or platform, and 2) the decisions of each set of agents affects the outcomes of the other set of agents, typically through an externality.”<sup>302</sup> In other words, consumer demand is interdependent, such that a consumer’s value of a good increases with the number of other

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<sup>300</sup> *U.S. Merger Guidelines*, § 5.1. Similarly, the European Commission notes that: “Supply-side substitutability may also be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy.” *See* Commission Notice, ¶ 20.

<sup>301</sup> *See* Commission Notice, ¶ 20.

<sup>302</sup> Rysman (2009), p. 125.

consumers also purchasing that same good. This is known as a network effect.<sup>303</sup> The emphasis of the intermediary or platform is the main difference between the literature on two-sided markets and network effects. As I have noted previously in my research, the definitions are similar: “a good exhibits an indirect network effect if demand for the good depends on the provision of a complementary good, which in turn depends on demand for the original good.”<sup>304</sup> Indeed, “the literature on two-sided markets could be seen as a subset of the literature on network effects,” where “papers on two-sided markets tend to focus on the actions of the market intermediary, particularly pricing choices, whereas papers on network effects typically focus on adoption by users and optimal network size.”<sup>305</sup>

125. Network effects arise indirectly (or virtually), when a higher number of users incentivizes innovation and development of complementary products, which then in turn increases the value to those purchasing the original good. The interdependence between agents on each side often creates a positive feedback loop in many markets where already strong firms get even stronger. One example is the market for Yellow Pages where “retailer demand for advertising increases in consumer usage and that consumer demand for directory usage increases in the amount of advertising.”<sup>306</sup>

126. Other examples of two-sided markets with indirect network effects include shopping malls, where retailers derive value from the number of shoppers and shoppers benefit from the variety of retailers, and payment mechanisms such as credit cards where the attractiveness of a

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<sup>303</sup> See, e.g., Shapiro, Carl, and Hal R. Varian, *Information rules: A strategic guide to the network economy*, Brighton, MA: Harvard Business Review Press, 1998, at p. 13; Katz, Michael L. and Carl Shapiro, “Network externalities, competition, and compatibility,” *The American Economic Review*, Vol. 75, No. 3, 1985, pp. 424-440, available at <https://www.jstor.org/stable/1814809>, at p. 424; Rochet, Jean-Charles and Jean Tirole, “Two-sided markets: a progress report,” *The RAND Journal of Economics*, Vol. 37, No. 3, 2006, pp. 645-667, available at <https://www.jstor.org/stable/25046265>.

<sup>304</sup> Rysman (2009), p. 127.

<sup>305</sup> Rysman (2009), p. 127.

<sup>306</sup> See Rysman, Marc, “Competition Between Networks: A Study of the Market for Yellow Pages,” *The Review of Economic Studies*, Vol. 71, No. 2, April 2004, pp. 483–512, available at <https://doi.org/10.1111/0034-6527.00512>, at pp. 484 and 508.



payment mechanism to merchants and consumers is affected by how many consumers/merchants use/accept the card.

127. The pricing structure also plays an important role in two-sided markets in that the intermediary chooses the price charged to each side of the platform accounting for the benefit any given consumer will have on other users' valuation of the product. Specifically, intermediaries have an incentive to reduce prices for those consumers whose consumption of the good will increase the valuation of the good for other users. Doing so is efficient because it compensates those consumers for the positive externality they impose on other users, thereby increasing demand for the good.

128. However, as I have explained in my own research, "markets are not inherently two-sided or not,"<sup>307</sup> and "[t]wo-sidedness is not a binary outcome endowed by the market but is typically rather a choice made by firms about what ways to be two-sided."<sup>308</sup> It is therefore perhaps not surprising that the economics literature has identified multiple ways to consider two-sided markets.<sup>309</sup>

129. At the broadest level of generality, and as noted above, two-sided markets are those with "some kind of interdependence or externality between groups of agents that the intermediary serves."<sup>310</sup> In other words, in two-sided platforms, demand from both parties is inter-dependent – *i.e.*, demand from one party influences demand from the other (and possibly vice versa) "in a way that is not mediated through prices."<sup>311</sup> Moreover, "[t]his phenomenon leads to efficiencies as more market participants are able to interact with each other but also, in some circumstances, market power, as network effects can protect platform owners from entry."<sup>312</sup> The risk of network effects creating a barrier to entry for potential competitors—the chicken and egg problem, where entrants

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<sup>307</sup> Jullien, Pavan & Rysman (2022), p. 8.

<sup>308</sup> Jullien, Pavan & Rysman (2022), pp. 8-9.

<sup>309</sup> Rysman, Marc, "Exclusionary Practices in Two-Sided Markets," *International Antitrust Law & Policy: Fordham Competition Law*, 2012 (hereafter "Rysman (2012)"), at pp. 538-540.

<sup>310</sup> Rysman (2009), p. 126. *See also* Rysman (2012), pp. 538-540.

<sup>311</sup> Rysman (2012), p. 538.

<sup>312</sup> Jullien, Pavan & Rysman (2022), p. 4.



must attract users on both sides of the two-sided platform simultaneously—is particularly acute “[i]n markets with low marginal costs, as is the case for many digital markets.”<sup>313</sup>

130. In addition, Hagiu & Wright (2015) note that two-sided platforms (or more generally, multi-sided platforms) have two distinct features, namely, enabling “direct interactions between two or more distinct sides” and affiliation with the platform by all relevant sides, beyond indirect network effects or non-neutrality of fees.<sup>314</sup> According to their definition, supermarkets and other old-fashioned retailers are “more like resellers than [multi-sided platforms] since they control the relevant decision variables like marketing activities, and prices.”<sup>315</sup> Put differently, if the wholesaler, rather than the “retailer” intermediary, sets the price that the end-user pays, the market is likely two-sided.<sup>316</sup>

131. However, even applying these different economic principles, “virtually all markets might be two-sided to some extent.”<sup>317</sup> Rather than classifying “firms with some binary distinction as being a platform or not,” economists “should see the platform nature of a firm as a continuous dimension.”<sup>318</sup> From the economist’s perspective, “[t]he interesting question is often not whether a market can be defined as two-sided...but how important two-sided issues are in determining outcomes of interest.”<sup>319</sup>

132. I have previously noted that “[m]arket definition has a clear analog in the two-sided market literature.”<sup>320</sup> In terms of the analytical tools to apply to market definition, they must

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<sup>313</sup> Jullien, Pavan & Rysman (2022), p. 4. *See also* Caillaud, Bernard and Bruno Jullien, “Chicken & egg: Competition among intermediation service providers,” *RAND journal of Economics*, Vol. 34, No. 2, 2003, pp. 309-328, available at <https://doi.org/10.2307/1593720> (hereafter “Caillaud & Jullien (2003)”), at pp. 309-310.

<sup>314</sup> Hagiu, Andrei and Julian Wright, “Multi-sided platforms,” *International Journal of Industrial Organization*, Vol. 43, 2015, pp. 162-174, available at <https://doi.org/10.1016/j.ijindorg.2015.03.003> (hereafter “Hagiu & Wright (2015)”), at p. 163.

<sup>315</sup> Hagiu & Wright (2015), p. 164.

<sup>316</sup> Rysman (2012), p. 539.

<sup>317</sup> Rysman (2009), p. 127 and Jullien, Pavan & Rysman (2022), p. 7 (“In reality, almost every real-world firm has some elements of two-sidedness to it”).

<sup>318</sup> Jullien, Pavan & Rysman (2022), p. 7.

<sup>319</sup> Rysman (2009), p. 127.

<sup>320</sup> Rysman (2012), p. 548.

recognize that firms in two-sided markets can profit from both sides or from one side at the expense of the other (*i.e.*, pricing below incremental cost to one group and recouping from the other).

Economists have argued that the SSNIP test can be performed on the platform so long as the test “account[s] for profits to the platform firm on both sides of the market.”<sup>321</sup> As I have explained:

In a two-sided market, we should keep in mind that when we raise the price on one side, the resulting reduction in quantity has implications for the other side—typically, it drives away agents on the other side and thus reduces profits. Thus, all else equal, the effect of considering a two-sided market is often to increase the size of the relevant market, since the price increases will be less attractive than they otherwise would be.<sup>322</sup>

133. Markets can move to a position where consumers single-home and migrate to one platform, while those wanting access to consumers multi-home across multiple platforms. This matters because the platforms in this context are monopolists over access to members that do not use other platforms (particularly if those consumers would not consider switching). In these cases, there is a sense in which platforms compete for consumers to use their platform, and then charge monopoly prices to the side of the market that is trying to reach those users.<sup>323</sup>

134. Filistrucchi et al. (2014), also considered whether the standard SSNIP test should be amended to account for indirect network effects, concluding that the SSNIP should be modified for two reasons:

The first reason is that, in a two-sided market, the traditional SSNIP test cannot be applied as it is usually conceived. As already noted, market definition should account for both sides of the market in order to correctly assess the competitive constraints faced by firms. The logic of the SSNIP test should thus be extended (and therefore the formulas for CLA

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<sup>321</sup> Rysman (2012), p. 548. *See, e.g.*, Evans, David S., “Two-sided market definition,” *ABA Section of Antitrust Law, Market Definition in Antitrust: Theory and Case Studies*, Forthcoming, April 29, 2009, available at [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1396751](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1396751), at p. 3 (“[O]ne common approach—using the price-cost margin on one side to assess critical loss tends—to understate the effects of a merger on prices compared with the two-sided market formula. Another approach—estimating demand elasticities directly based on a standard one-sided model—tends to overstate the effects of a merger on prices.”).

<sup>322</sup> Rysman (2012), p. 548.

<sup>323</sup> Rysman (2009), p. 131. *See also* Armstrong, Mark, “Competition in two-sided markets,” *The RAND Journal of Economics*, Vol. 37, No. 3, 2006, pp. 668-691, available at <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1756-2171.2006.tb00037.x>.

[Critical Loss Analysis]<sup>324</sup>) in order to account for the indirect network effects between the two sides of the market when judging the profitability of a price increase.<sup>325</sup>

The second reason why the test should be modified is that, if one wants to use a SSNIP test (or CLA) in a two-sided market, one should follow the original rationale of the test: defining the market as the smallest set of products on which a monopoly would find it profitable (or profit-maximizing) to exercise market power by non-temporarily raising the price above the current competitive level (at least) by a small but significant percentage.<sup>326</sup>

This view suggests that one should check the profitability of the sum total price paid by all parties when considering a two-sided market.<sup>327</sup>

## **B. Application of the Market Definition Framework to this Case**

135. The market for an app distribution platform on a mobile OS relies on indirect network effects. First, mobile OSs intermediate between hardware devices (*e.g.*, smartphones and tablets) and software applications (*e.g.*, social media and games), thus requiring the adoption of hardware by consumers and the development of applications by software developers. Apps are an important part of the user experience, with the quantity and quality of apps available a key factor in a customer's value of the device (and ecosystem).<sup>328</sup> These effects are indirect because a consumer

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<sup>324</sup> Note that "CLA" stands for critical loss analysis.

<sup>325</sup> See Filistrucchi, Lapo, Damien Geradin, Eric van Damme, and Pauline Affeldt, "Market definition in two-sided markets: Theory and practice," *Journal of Competition Law & Economics*, Vol. 10, No. 2, June 2014, pp. 293-339 (hereafter "Filistrucchi et al. (2014)"), at p. 330.

<sup>326</sup> See Filistrucchi et al. (2014), pp. 331.

<sup>327</sup> See, *e.g.*, Filistrucchi et al. (2014), p. 333.

<sup>328</sup> Brady (Google) Deposition, pp. 64-65 ("Q. Why was the developer ecosystem important in the adoption of the Android platform? A. Because generally computers are more useful when there are applications available for them. And so I think if we wanted Android as a platform to be compelling for OEM -- for mobile device manufacturers, it would have to be compelling for consumers, for the product to be compel -- for the platform to be compelling for consumers, it would need to have applications available that were written by third-party developers. Q. And so the fewer applications that would be available for the platform, the less attractive the platform would be to consumers? A. I think generally that's true. It certainly wasn't a raw numbers game. Having a lot of applications that aren't terribly useful or aren't good is not going to make the platform more useful. But generally, you know, having -- we wanted to create a platform that enabled developers to build, you know, rich and useful applications that would be useful to consumers. And, you know, we felt that was certainly the priority."); Dury (GetJar) Deposition, pp. 94-95 ("Q. When you say 'would probably be much more aligned with Android Market,' what, if anything, was causing Android Market and GetJar to not be aligned? A. In -- because of unknown sources, developers didn't have many choices for distributing apps. And because they were required to use Google Checkout, they only had a poorer choice for payments. And the result was fewer distribution options and worse monetization, which meant that the best developers were not yet on Android. And so, the ecosystem was much smaller than it could have been.").

does not rely on other people owning the same device per se; the benefits come from the incentive for app developers to develop apps for a given OS ecosystem. In turn, the quality and quantity of apps available entice more consumers to use that OS.

136. Second, in terms of app distribution, as explained in Section IV.A.4 above, I understand that Google does not buy apps or in-app content from developers at a fixed price and quantity and then through Google Play Store re-sell an inventory of apps to end-users of Android smart mobile devices. Rather, at the app distribution stage, the developer makes a profit only from the purchase of apps by an end-user.<sup>329</sup> If no end-user buys the app, the developer makes nothing from having the app listed in Google Play. As discussed at paragraph 130 above, this structure suggests that Google operates the Play Store as a two-sided app distribution platform.

137. Finally, in terms of in-app billing, Google provides billing services directly to developers, who use billing services as an input to sell the in-app content product to users. There are no strong indirect network effects or interdependence between the sides of the market, and therefore I analyze in-app billing services as a traditional one-sided market, as explained further below in Section V.D.3.

138. I determine that there are two relevant antitrust markets, accounting for Google's product and potential substitutes at each level, which are relevant to evaluating Google's challenged conduct:

- The Android App Distribution Market, a two-sided market, which includes the dynamics between app distribution platform owners, developers choosing how to distribute their apps, and consumers choosing between different distribution methods; and
- The Android In-App Billing Market, focusing on developers choosing between competing in-app billing service providers. As mentioned above, I consider in-app billing services to be a one-sided market where developers are the customers of these services. The differences in my assessment of this market are explained further below.

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<sup>329</sup> This excludes the profit a developer may make from any in-app purchases or by any other means within the app (*e.g.*, advertising).

139. In the next section, I apply the principles of market definition set out in Section V.A to each of the candidate markets and conclude that each is a relevant market for evaluating the Google conduct claimed to be anticompetitive.

**C. App Distribution on Android Smart Mobile Devices is a Relevant Market**

*1. Introduction*

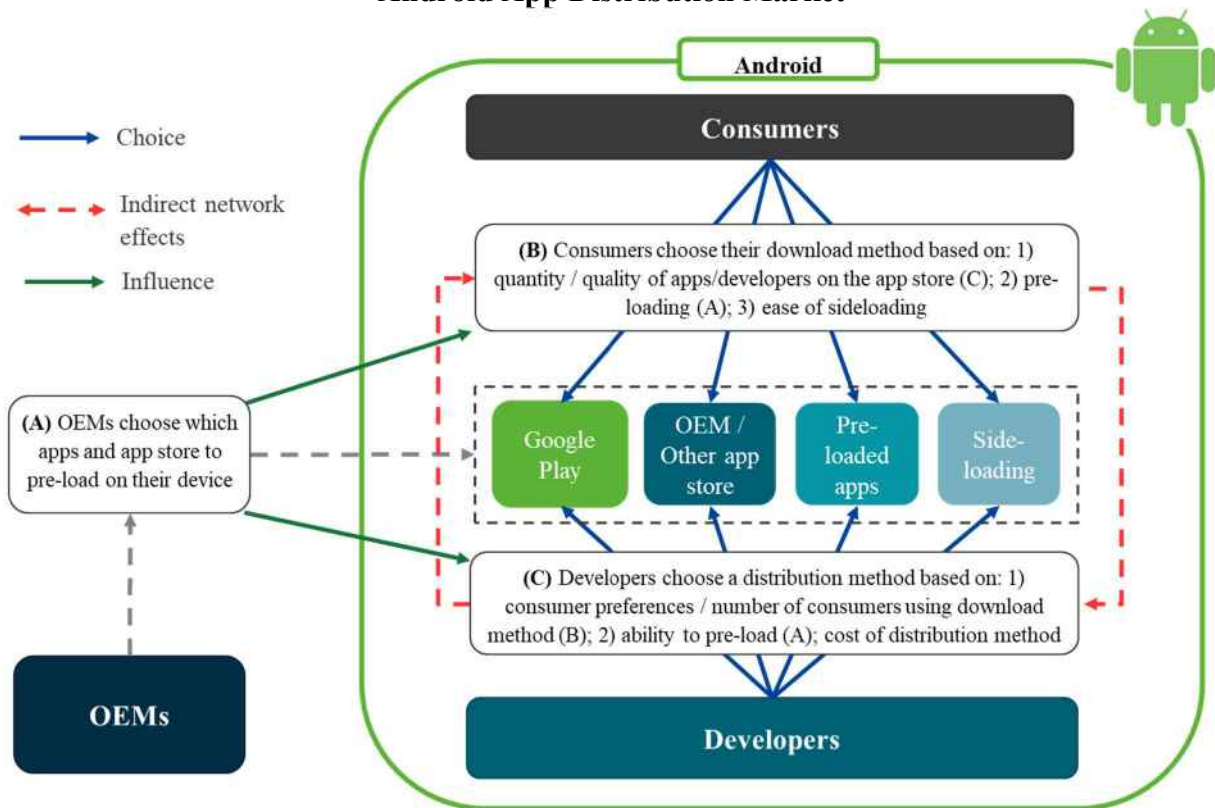
140. The first antitrust market pertinent to evaluating Google’s challenged conduct is the worldwide (excluding China) Android App Distribution Market. After developing their apps for a particular mobile OS, app developers must decide how to distribute their apps to users of that mobile OS ecosystem. With respect to Android, absent Google’s restrictions, this decision would be influenced by several factors, including the number of consumers using the various distribution methods (*i.e.*, the indirect network effects) – which directly influences the number of potential sales, the choices available in any tied markets such as in-app billing services, the cost of each distribution method (*i.e.*, the commissions or revenue sharing arrangements), and any ability to pre-load their apps. As noted in Section III.C.1, the Google Play Store is the leading app distribution platform on Android. However, absent Google’s challenged conduct, alternative distribution methods, including OEM app stores (*e.g.*, the Samsung Galaxy Store), third-party app stores (*e.g.*, F-Droid), pre-installed apps, and sideloading, would likely be more viable alternatives for app developers to distribute their apps than in the actual world in which Google imposes the various anticompetitive restrictions described in Section IV.B.

141. From a consumer perspective, after choosing a smart mobile device with a pre-installed OS, consumers may then search for or obtain apps using different methods. The consumer’s choice of where to obtain apps is influenced by whether they have a particular app in mind, the app store that was pre-installed on the mobile device (*i.e.*, the default app store and its placement on the home screen), any apps that were pre-installed on the device, the quantity and quality of app developers using the different app stores, and the ease with which apps can be sideloaded onto the device, among other factors.

142. For smart mobile device users who have opted into the Android ecosystem, the distribution methods include the various means through which they can access *Android* apps. The

Android App Distribution Market therefore comprises the following means by which Android apps may be distributed to Android mobile device users in a world absent Google's challenged conduct (as also set out in Section III.C): The Google Play Store; other app stores that are available for Android including, for example, the Samsung Galaxy Store (on Samsung devices), Amazon Appstore, and F-Droid; OEMs pre-installing their own apps or apps from third-party developers on their Android smart mobile devices; and sideloading, such as downloading directly from a developer's web page using a mobile browser or peer-to-peer transfer between two smart mobile devices via a wireless connection (*e.g.*, Bluetooth or Wi-Fi) or physical connection (*e.g.*, USB or memory cards). Exhibit 18 provides a depiction of the various distribution channels included in the two-side Android App Distribution Market and the consumer, developer, and OEM choices in this market.

**Exhibit 18**  
**Android App Distribution Market**



143. As explained further below, distribution methods for accessing non-Android non-mobile apps, such as the Apple App Store, app stores on PCs or gaming consoles, or using apps in a

web browser (“web-based apps”), do not compete with these Android app distribution methods. Due to technical barriers (*i.e.*, incompatibility with Android smart mobile devices) and the different use cases for these other devices, these app stores are not credible substitutes for the Google Play Store or any other Android app distribution method.<sup>330</sup> Therefore, I find that a relevant app distribution market is limited to the Android App Distribution Market.

144. In the remainder of this section, I describe in more detail the relevant constraints on the Google Play Store from both the consumer and developer perspectives, whether other alternatives for mobile app distribution such as the Apple App Store and PC/console app stores form part of the relevant market, and the relevant geographic market for Android App Distribution. In summary, my conclusions on the relevant market and Google’s market power would be the same regardless of this particular characterization, so the particular type of two-sided market does not affect my overall conclusions in this case.

## 2. *Consumer Choice of App Distribution Method*

145. OEMs pre-install certain apps on Android smart mobile devices (either for their own purposes or via agreements with third parties). If users want to install additional apps on their devices, they must download them via an app store or sideloading. Before users can download apps from a specific app store, they must first access the app store itself. Typically, OEMs pre-install at least one app store on Android smart mobile devices (and, in most instances for reasons explained below, it is the Google Play Store).<sup>331</sup> The default or pre-installed app store option on the mobile device is important because most consumers default to using one of the pre-installed app stores on

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<sup>330</sup> “On Apple devices, apps are typically written in Swift or Objective-C; thus, iOS provides middleware libraries for use by Swift apps and Objective-C apps. A consequence is that iPhone apps written in Swift or Objective-C will generally not run on Android phones due to (among other things) the absence of the middleware required by those apps. For similar reasons, Android apps written in Java are generally unable to run on iPhones. So, app distribution channels on iPhones cannot be trivially ‘transplanted’ to Android phones, nor can app distribution channels on Android be trivially used on iPhones.” See Mickens Report, ¶79.

<sup>331</sup> EC Google Android Decision, ¶ 596 and Table 4.



their Android smart mobile devices when downloading additional apps.<sup>332</sup> Google employees have also noted the pre-install advantage from prominent placement with an internal email noting that “[f]ortunately, we’ll always have the placement/pre-install advantage which is 90% of the battle.”<sup>333</sup>

146. As noted in Section IV.B, Google requires OEMs of Android smart mobile devices to pre-install the Google Play Store in order to license Google Mobile Services (“GMS”), a suite of proprietary Google apps (including Gmail, YouTube, and Google Maps) and APIs (or Google Play Services), and use the Android trademark, via its Mobile Application Distribution Agreements (“MADAs”).<sup>334</sup> The MADAs further require OEMs to make the Google Play Store undeletable and place it prominently on the device’s home screen, as well as restrict the use of the “long press ” button to a Google app.<sup>335</sup> Thus, “flagship devices from Samsung, LG, HTC and Motorola all come with the Google Play store preinstalled.”<sup>336</sup> Google noted that the Google-approved devices

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<sup>332</sup> Rosenberg (Google) Deposition, p. 23 (“Q. In Google's view, having two app stores on a single Samsung Android device would have led to consumer confusion? A. It would depend on -- it would depend on the nature of those app stores, the execution of those -- of those app stores, so it had the potential to.”); Email from Tim Carter, Google, to John Lagerling, former Senior Director of Android Global Partnerships for Google, “Subject: Re: Fwd: Andy feedback on Unbundling / GMS,” November 1, 2010, GOOG-PLAY-001404176-180, at 176 (“[M]ost users just use what comes on the device. People rarely change defaults.”); Google, “Android Work,” GOOG-PLAY-000042588.R-622.R, at 600.R (“Google Play and other pre-installed app stores (OEM and Carriers) are the only approved App Stores allowed to install apps.”); Google, “Play 2018 Planning Summit,” 2018, GOOG-PLAY-000292207.R-230.R, at 226.R (“If we were honest we would admit that most users and developers aren’t consciously ‘choosing[,]’ they are going with the default.”); and CMA Final Report on Mobile Ecosystems, ¶¶ 4.108-4.121 and FN 268.

<sup>333</sup> See Email from Ben Serridge, Google, to Jonathan Zepp, Google, “Subject: Re: Vudu app,” March 6, 2013, GOOG-PLAY-006355073-074, at 073.

<sup>334</sup> For example, in a copy of MADA signed by Samsung, under § 2.1. License Grant, it stated that “[d]evices may only be distributed if all Google Applications (excluding any Optional Google Applications) authorized for distribution in the applicable Territory are pre-installed on the Device[.]” See Google and Samsung, “Mobile Application Distribution Agreement (Android),” June 1, 2014, GOOG-PLAY-000449883-897, at 885.

<sup>335</sup> See Google and Samsung, “Mobile Application Distribution Agreement (Android),” January 1, 2011, GOOG-PLAY-001471037-050, at 041 and Google and Motorola Mobility, “Mobile Application Distribution Agreement (MADA),” January 1, 2018, GOOG-PLAY4-005406595-618, at 600. See also Kolotouros (Google) Deposition, pp. 452-453 (“Q. Okay. I understand. So, with respect to long press and the home button, it’s true that as a condition of the MADAs, that a long press on the home button leads to a Google app as opposed to a third-party app, correct? A. To the extent the OEM elects to preload GMS, one of the conditions is for the long press on home to point to the Google assistant; that is correct.”).

<sup>336</sup> Graziano, Dan, “How to download and install the Google Play store on any Android device,” *CNET*, October 16, 2015, available at <https://www.cnet.com/tech/mobile/how-to-download-and-install-the-google-play-store-on-any-android-device/>.

installed with GMS reached 2.5 billion.<sup>337</sup> According to OEMs like LG and Huawei, the Google Play Store is “the main pre-installed” app store and “any other app store does not have more contents.”<sup>338</sup> Some OEMs, like Samsung, pre-install their own app store (the Galaxy Store) in addition to the Google Play Store.<sup>339</sup> However, Google is concerned about “a loss of revenues from the Play Store” that results from Android app store fragmentation and has attempted to prevent “unnecessary competition” from Samsung Galaxy Store and other alternative Android app stores.<sup>340</sup> As shown in Section VI.A.3, Google has succeeded in limiting competition from these alternative Android app stores.

147. As noted above, while OEMs can choose not to pre-install the Google Play Store, doing so prevents the OEM from offering any of the GMS apps or utilizing Google’s APIs.<sup>341</sup> Amazon, for example, does not pre-install the Google Play Store on its tablets (which run on an Android fork called Fire OS) and instead pre-installs its own app store called Amazon Appstore.<sup>342</sup> As a consequence, on Amazon tablets, certain “third-party apps might not work properly or outright refuse to open in some cases... because apps heavily rely on the device’s GMS backbone[;]” such

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<sup>337</sup> Google, “Devices, attestation & integrity,” GOOG-PLAY-000218781.R-862.R, at 801.R.

<sup>338</sup> EC Google Android Decision, ¶ 277.

<sup>339</sup> According to Samsung, the Galaxy Store “could be a viable substitute” to the Google Play Store “[i]n terms of features and functionalities”). See EC Google Android Decision, ¶ 276.

<sup>340</sup> See Google, “Google-Samsung Store Agreement Term Sheet,” June 20, 2019, GOOG-PLAY4-004259430-432, at 430 and Rosenberg (Google) Deposition, p. 74 (“Q. While you were talking to Samsung and you might have been expressing to Samsung that what they were doing was contributing to the fragmentation, Google internally was concerned about a loss of revenues from the Play Store, right? A. That was one of the concerns that we had with this dynamic.”).

<sup>341</sup> As noted in the CMA Final Report on Mobile Ecosystems, Appendix E ¶ 6: “Google Play Services APIs may allow third-party developers to make use of basic features and functionalities such as push notifications or to communicate with Google’s first-party services (such as Google Maps, Search, Gmail, and Translate on Android) and create rich features compatible with Android.”).

<sup>342</sup> See Davenport, Corbin, “The ultimate guide for installing the Google Play Store on Amazon Fire tablets,” *Android Police*, August 11, 2022, available at <https://www.androidpolice.com/install-play-store-amazon-fire-tablet/>.

problems arise for example with apps that rely on Google Maps (including, *e.g.*, Uber or Lyft) or require users to log-in with a Google account.<sup>343</sup>

148. Consumers can use alternative app stores other than those already pre-installed on their Android smart mobile device. An alternative app store is itself an app. Because the Google Play Store does not make any alternative app stores available for download,<sup>344</sup> to use an alternative app store, consumers must first sideload the alternative app store onto their smart mobile devices, typically by downloading the app store directly from the app store developer's website (and, in doing so, receive the warning messages described in Section III.C.2 above).<sup>345</sup> According to Google's internal documents, the percentage of active Android smart mobile devices with sideloaded app stores is minimal.<sup>346</sup>

149. Not all Android app stores function on every Android mobile device. For example, while the Google Play Store is available on almost every Android mobile device (as shown in Exhibit 40),<sup>347</sup> the Samsung Galaxy Store functions only on Samsung smart mobile devices.<sup>348</sup> Consumers' ability to switch or multi-home between Android app stores is thus limited to those alternative app stores that are functional on the consumers' specific Android mobile device.

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<sup>343</sup> See Wankhede, Calvin, "What are Google Mobile Services (GMS)?," *Android Authority*, March 3, 2022, available at <https://www.androidauthority.com/google-mobile-services-gms-3025963/>. See also Google, "Huawei TGL\* anticipated expiration: Implications & next steps DT Group" August 2020, GOOG-PLAY-000093636.R-673.R, at 647.R, which states that "Without GMS and Play, users will be unable to easily find & access their favorite apps and games," including "No Google Maps or apps that rely on Maps API (*e.g.*, Uber)."

<sup>344</sup> See Hindy, Joe, "10 best third party app stores for Android and other options too," *Android Authority*, June 30, 2022, available at <https://www.androidauthority.com/best-app-stores-936652/>.

<sup>345</sup> For example, Amazon Appstore and Aptoide are available for download on their developer's website. See Hindy, Joe, "10 best third party app stores for Android and other options too," *Android Authority*, June 30, 2022, available at <https://www.androidauthority.com/best-app-stores-936652/>; Amazon, "Amazon Appstore App For Android," available at <https://www.amazon.com/gp/mas/get/android/>; and Aptoide, "Aptoide," available at <https://en.aptoide.com/>.

<sup>346</sup> See Google, "App Stores on Android 12," February 2021, GOOG-PLAY-006814475.R-497.R, at 477.R (showing that the share of active Android smart mobile devices with sideloaded apps is only ■ in Japan, ■ in the U.S., ■ in South Korea, and ■ in India).

<sup>347</sup> See Broida, Rick, "How to install Amazon Appstore on your Android device," *CNET*, June 25, 2015, available at <https://www.cnet.com/tech/services-and-software/how-to-install-amazon-appstore-on-your-android-device/>.

<sup>348</sup> See Mehvish, "What's the Difference Between Galaxy Store and Play Store," *Techwiser*, August 9, 2021, available at <https://techwiser.com/difference-between-galaxy-store-play-store/>.

150. Moreover, as discussed in Section III.A.3, alternative Android app stores are currently a limited substitute for the Google Play Store because they have limited numbers of apps relative to the Google Play Store. For example, the Amazon Appstore offered fewer than 500,000 apps in the first quarter of 2021, compared to over 3.5 million apps on the Google Play Store.<sup>349</sup>

151. Further, while Android users can, in theory, forego app stores altogether by sideloading apps directly onto their device,<sup>350</sup> the viability of sideloading as an alternative to the Google Play Store is currently limited by the fact that it requires users to change the security settings on their Android smart mobile devices to permit installations from “Unknown sources” and proceed through multiple steps containing warning messages.<sup>351</sup> In internal documents, Google describes a 15-step process that is necessary to sideload an app and concedes that lowering the security setting is a “friction” for users.<sup>352</sup> Google admits that “any kind of friction will reduce installs... there is about a [REDACTED] drop off for every acquisition in play, so for non-play we expect similar.”<sup>353</sup> Indeed, in another document, Google states “the Android Security Team published a set of data showing that fewer [than] [REDACTED] of installs in the last year occurred after a user received a

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<sup>349</sup> See Ceci, L., “Number of apps available in leading app stores as of 2<sup>nd</sup> quarter 2022,” *Statista*, August 11, 2022, available at <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>.

<sup>350</sup> In contrast, Apple does not allow users to sideload apps on iOS devices to “prevent third party applications or software from being downloaded to the phone.” The only way for iOS users to get around Apple’s restriction is to “jailbreak” their device. However, jailbreaking is “technically difficult” and constitutes “a violation of the iOS end-user software license agreements” under which Apple “may deny service for an iPhone or iPad that has installed any unauthorised software via jailbreaking.” See CMA Final Report on Mobile Ecosystems, ¶¶ 4.101-4.103 and FN 293.

<sup>351</sup> For example, sideloading the Amazon Appstore will trigger “the unknown sources install flow” that requires a series of steps of change the settings to allow the installation. See Rosenberg (Google) Deposition, pp. 295-297; Samat (Google) Deposition, pp. 178-185; and Rubin (formerly Google) Deposition, pp. 300-301 (Android users must “go to settings, applications and check the unknown sources box” to enable downloading from “any source other than Android Market.”). See also Hoff, John, “How To: Sideloading Apps on Your Android Device,” *Android Community*, April 17, 2018, available at <https://androidcommunity.com/how-to-sideloading-apps-on-your-android-device-20180417/>; and EC Google Android Decision, ¶¶ 276-277.

<sup>352</sup> Google, “Amazon Underground User Experience,” November 2015, GOOG-PLAY-000297309.R-329.R, at 310.R-314.R and Google, “Project Banyan-Phase 1: Ecosystem Overview Backup,” February 2019, GOOG-PLAY-002011285.R-290.R, at 288.R.

<sup>353</sup> Google, “Amazon Underground User Experience,” November 2015, GOOG-PLAY-000297309.R-329.R, at 310.R-314.R and Google, “Project Banyan-Phase 1: Ecosystem Overview Backup,” February 2019, GOOG-PLAY-002011285.R-290.R, at 288.R.

warning that the app was potentially harmful.”<sup>354</sup> Consequently, even though apps may be available for sideloading, only a small share of apps on Android smart mobile devices is sideloaded.<sup>355</sup>

152. Given these limitations of alternative app stores and sideloading imposed by Google’s challenged restrictions, it is unsurprising that the number of apps installed via these methods is small. According to data produced by Google, around [REDACTED] of apps (on a monthly average) on active Android smart mobile devices were “downloaded by a user from non-Play sources, including from direct downloading and third-party app stores” from February 2019 to December 2020.<sup>356</sup> This low level of sideloading is supported by the following additional sources:

- According to Google data gathered by the CMA, in May 2021, only 3.5 – 4 million app downloads occurred via app stores that were not pre-installed by the OEM or via sideloading, compared to an average of 100 – 200 million app downloads per month via the Google Play Store in 2021.<sup>357</sup>
- Worldwide (excluding China), sideloading on Android smart mobile devices is concentrated among a few countries that have a larger prevalence of peer-to-peer app sharing or third-party app stores (*e.g.*, India, Indonesia, and South Korea).<sup>358</sup>

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<sup>354</sup> Google, “Auto scan blog post,” GOOG-PLAY-000415076-078, at 076. *See also* Google, “App stores in Android 12,” March 24, 2020, GOOG-PLAY-004904016.R-118.R, at 038.R (Google presentation stating that prior to Android’s “O” version, [REDACTED] of “users who encountered the ‘unknown source’ warning” stopped the installation at that point). This is consistent with the results of the Presser Report, which found that between 82% and 86% of respondents shown a sideloading warning message “said they would feel the app was not safe to download” and that 84% of respondents who saw the warning message would be less likely to download the app. *See* Presser Report, p. 9.

<sup>355</sup> *See, e.g.*, Google, “P2P in Phonesky,” December 2019, GOOG-PLAY-004662365.R-402.R, at 367.R and 396.R. This is also consistent with the CMA’s finding that “only a small proportion of downloads on Android devices are via sideloading.” *See* CMA Final Report on Mobile Ecosystems, ¶¶ 4.108-4.112 and FN 297. Another Google document shows that in 2020, the fraction of sideloaded app installs was below [REDACTED] countries (excluding China), and the overall fraction of sideloading was [REDACTED] worldwide excluding China. *See* Google, “Sideload vs. Play Installs worldwide,” GOOG-PLAY-000806246.

<sup>356</sup> *See* Google, “Apps by Source,” GOOG-PLAY-001508603 and Rysman Workpapers. Note that [REDACTED] is calculated as the number of non-system sideloaded apps over the period (*i.e.*, apps downloaded by users through alternative app stores or direct downloading) as a percent of the number of apps on devices over that same period, which includes both apps installed via the Google Play Store and third-party apps stores, and system and non-system apps. *See* footnote 78 for further detail on document GOOG-PLAY-001508603.

<sup>357</sup> *See* CMA Final Report on Mobile Ecosystems, ¶¶ 4.108-4.112 and FN 268.

<sup>358</sup> *See, e.g.*, Google, “P2P in Phonesky,” December 2019, GOOG-PLAY-004662365.R-402.R, at 367.R and 396.R.

- A Google internal document states the share of apps installed “off-Play” was [REDACTED] in India, [REDACTED] in South Korea, and only [REDACTED] in the United States from June 2016 to October 2016.<sup>359</sup>
- According to Google’s email correspondence, the share of apps sideloaded in emerging countries (*e.g.*, India, Indonesia, Brazil, Russia, Mexico) was between [REDACTED] during 2016 to 2018.<sup>360</sup>

153. Despite the evidence of minimal consumer use of alternative Android app stores under current market conditions, there are no significant costs to downloading an alternative Android app store besides the unknown sources warning. Thus, in a world absent Google’s challenged restrictions, consumers could choose alternative Android app distribution methods (such as a rival app store or sideloading an app directly from the developer), especially if alternative Android distribution methods were competitive on the quality and quantity of apps available.

### 3. *Developer Choice of App Distribution Method*

154. As noted above, after making the initial decision to develop their apps for the Android OS, developers then choose the method to distribute these apps to Android users, whether via an Android app store and/or via sideloading. While Google argues that the Google Play Store competes more broadly, Google specifically noted that “on Android devices,” it competes with third-party app stores, including: “Samsung Galaxy Store, Tencent Appstore, Xiaomi GetApps, Huawei App Gallery, Vivo App Market, Oppo App Market Store, LG Smart World, OneStore, KT Store, F-Droid, APKPure, APKMirror, and Amazon Appstore”; “OEM pre-installations”; and “direct distribution of apps through web sites accessed through web browsers” (aka sideloading).<sup>361</sup>

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<sup>359</sup> See Google, “Off-Play Installs (a.k.a. Sideloaded),” October 7, 2016, GOOG-PLAY-000042623.R-639.R, at 632.R. These statistics have been supported by other Google’s ordinary course documents that provided the volume or share of sideloading by country. See also Google, “Emerging markets group 2 ideas,” GOOG-PLAY-000571537.

<sup>360</sup> Email from James Bender, Google, to Paul Bankhead, Chief Product Officer of MasterClass for Google, and Aaron Rothman, Google, “Subject: Re: Off Play Installs as a % of total, absolute #s,” July 25, 2018, GOOG-PLAY-001254353-355, at 354.

<sup>361</sup> “Defendants Google LLC, Google Ireland Limited, Google Commerce Ltd., Google Asia Pacific Pte. Ltd. and Google Payment Corp.’s Responses and Objections to Epic’s Second Set of Interrogatories to Defendants,” *Epic Games Inc. v. Google LLC et al.*, Case No. 3:20-cv-05671-JD, July 19, 2021, at p. 10.



155. In late 2017 and early 2018, Google became increasingly concerned that “[d]evelopments in the ecosystem are motivating and creating opportunities for partners to explore Play alternatives,” in part due to developers wanting a “larger share of user revenue” and to “grow new service revenue stream[s].”<sup>362</sup> In 2019, Google launched Project Banyan in response to “increased competition from app store rivals,” including the Samsung Galaxy Store, ONE store, Epic Store and Amazon App Store, noting that they were “investing in Game Distribution + exclusive content acquisition” and that “key developers are evaluating options,”<sup>363</sup> as shown in Exhibit 19.

**Exhibit 19**  
**Recent Developments in the App Distribution Market**

**Recent developments:** Ecosystem partners are investing in Game Distribution + exclusive content acquisition; key developers are evaluating options

STORE		GEO FOCUS	ACTIVITY
Mobile	OEM	 Samsung	Global
	Carrier	 One Store	Korea
Platform		 Epic Store	Global
		 Amazon App Store	Japan

Source: Google, “Project Banyan-Phase 1: Ecosystem Overview,” February 2019, GOOG-PLAY4-004258208-234 at 216.

156. Because different consumers may use different Android smart mobile devices with different pre-installed app stores or have a preference for certain distribution methods (*e.g.*, a third-party app store or sideloading), developers can ensure that their apps are available to a larger

<sup>362</sup> Google, “Project Hug: Risk & Leakage Model,” February 2018, GOOG-PLAY-000005203.R-312.R, at 207.R.

<sup>363</sup> Google, “Project Banyan-Phase 1: Ecosystem Overview,” February 2019, GOOG-PLAY4-004258208-234, at 215-216.



number of consumers by publishing their apps on multiple distribution channels within the Android App Distribution Market. As described in Section III.B, some app developers tend to multi-home by publishing apps across different app stores. For example, 28 out of the 50 top games on the Google Play Store are also published on the Amazon Appstore.<sup>364</sup> Nonetheless, the number of apps published on the Google Play Store vastly outnumbers the number of apps offered on any other Android app store.<sup>365</sup>

157. Witness testimony by developers suggests that developers prioritize publishing apps on the Google Play Store primarily because it is available to the largest number of users. For example, developers at Nexon and Electronic Arts prioritized the Google Play Store “because it has a large volume of users”<sup>366</sup> and “[they] felt that the launching on Google Play would give [them] a broad distribution reach opportunity.”<sup>367</sup> Although alternative Android app stores “made some compelling business cases for the opportunities that [they] had available ... [they] just had to just make some prioritization decisions. And Google Play was the largest distribution platform opportunity on Android, and [their] thinking was let's get that done right before [they] think about adding on additional opportunities.”<sup>368</sup> In contrast, the user reach through sideloading, for example, was “too difficult to tell” to justify the investment and would require “too much work, engineering work ... to build [their] own ... platform.”<sup>369</sup>

158. Nonetheless, I find that technical barriers and financial requirements would not inhibit developers from multihoming. While there are some technical barriers to making Android apps available on different distribution channels, the “similarities in the source code between different Android OSs” means it is relatively easy for developers to modify an app to ensure its

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<sup>364</sup> See Google, “Project Hug: Risk & Leakage Model,” February 2018, GOOG-PLAY-000565850-956, at 905.

<sup>365</sup> As of 2<sup>nd</sup> quarter of 2022, there are about 3.5 million apps available on the Google Play Store, whereas approximately 48,000 apps are available on the Amazon Appstore. See, e.g., Ceci, L., “Number of apps available in leading app stores as of 2<sup>nd</sup> quarter 2022,” August 11, 2022, available at <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>.

<sup>366</sup> Koh (EA (formerly Google)) Deposition, pp. 89-90.

<sup>367</sup> Koh (EA (formerly Google)) Deposition, pp. 321-324.

<sup>368</sup> Koh (EA (formerly Google)) Deposition, p. 322.

<sup>369</sup> Koh (EA (formerly Google)) Deposition, pp. 50-51 and 101-102.

functionality on various Android smart mobile devices.<sup>370</sup> While developers may also need to pay a fee for every additional app store on which they publish their app, such one-time fees are modest or even free. For example, the Google Play Store charges a one-time developer fee of USD \$25, while the Samsung Galaxy Store is free of charge for developers.<sup>371</sup>

159. Therefore, I find that, in the world absent Google’s challenged restrictions, developers would be more incentivized to distribute their apps via alternative distribution methods that offer them a higher share of the revenues on app sales and in-app purchases and to multi-home across several distribution methods. Finally, given the likelihood that consumers use multiple distribution channels, developers would have a further incentive to actively promote the distribution of their apps via alternative platforms (or via sideloading), for example by offering lower prices for their apps or its in-app content to their consumers. Indeed, as shown in Exhibit 20 below, Google has internally recognized developers’ incentives to co-list their apps across multiple app stores for benefits such as “[s]ales shift to low/ no rev-share channel.”<sup>372</sup>

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<sup>370</sup> See EC Google Android Decision, ¶ 282.

<sup>371</sup> See Team Isrg KB, “How to upload Android app or Game on Samsung Galaxy Store?” *ISRG KB*, available at <https://www.isrgrajan.com/how-to-upload-android-app-or-game-on-samsung-galaxy-store.html>.

<sup>372</sup> Google, “Project Hug: Risk & Leakage Model,” February 2018, GOOG-PLAY-000005203.R-312.R, at 256.R.

**Exhibit 20**  
**Google Recognizes Developers' Incentives to Multi-Home**

Developer has a greater incentive to co-list			
Benefit to Developer		Cost to Developer	
<ul style="list-style-type: none"> <li>+ Sales shift to low / no rev-share channel</li> <li>+ Possibly ongoing customer discounts</li> <li>+ Possibly special customer UA &amp; promos</li> </ul>		<ul style="list-style-type: none"> <li>- Play search and top-chart rankings suffer</li> <li>- Concerned with Play relationship?</li> <li>- Overhead to support distinct APK, Customer Service, and LiveOps</li> </ul>	
Selected Co-Listed Titles		Selected Only-on-Play Titles	
<b>ONE store</b> <ul style="list-style-type: none"> <li>• Mu Origins</li> <li>• Three Kingdoms M</li> <li>• FIFA Online 4 by EA</li> <li>• Clash of Kings</li> </ul>	<b>amazon appstore</b> <ul style="list-style-type: none"> <li>• Monster Strike</li> <li>• Candy Crush Saga</li> <li>• Lords Mobile</li> <li>• Clash of Clans</li> <li>• Gardenscapes</li> <li>• Final Fantasy XV</li> <li>• Summoner's War</li> <li>• Mobile Strike</li> <li>• Puzzles and Dragons</li> </ul>	<ul style="list-style-type: none"> <li>• Lineage M</li> <li>• Mu Origin 2</li> <li>• Fate Grand Order</li> <li>• Lineage 2 Revolution</li> <li>• Pokemon Go</li> <li>• Clash Royale</li> <li>• Guns of Glory</li> <li>• Dragon Ball Z Dokkan Battle</li> <li>• Fire Emblem Heroes</li> </ul>	
<b>SAMSUNG Galaxy Apps</b> <ul style="list-style-type: none"> <li>• Black Desert M</li> <li>• Hearthstone</li> <li>• PUBG</li> </ul>			

Source: Google, "Project Hug: Risk & Leakage Model," February 2018, GOOG-PLAY-000005203.R-312.R at 256.R.

4. *App Distribution on Alternative Devices does not Constrain App Distribution on Android Smart Mobile Devices*

a) Role of switching costs in defining the relevant markets

160. Before discussing the alternative markets, it is worth highlighting the importance of switching costs when assessing the boundaries of the relevant market. As noted in the economics literature, switching costs often create high barriers to entry that lock in consumers to a series of future purchases based on an initial purchase, thereby granting an incumbent firm substantial market power and raising concerns about competition and innovation:<sup>373</sup>

Large switching costs lock in a buyer once [the buyer] makes an initial purchase, so [the buyer] is effectively buying a series of goods.

<sup>373</sup> See Farrell, Joseph, and Paul Klemperer, "Coordination and lock-in: Competition with switching costs and network effects," *Handbook of Industrial Organization*, Vol. 3, 2007, pp. 1967-2072, available at [https://doi.org/10.1016/S1573-448X\(06\)03031-7](https://doi.org/10.1016/S1573-448X(06)03031-7), at pp. 1970 and 1972.

Lock-in hinders customers from changing suppliers in response to (predictable or unpredictable) changes in efficiency, and gives vendors lucrative ex post market power – over the same buyer in the case of switching costs (or brand loyalty), or over others with network effects.

161. Switching costs can include compatibility costs (*e.g.*, purchasing complementary products or services from the same supplier), transaction costs (*e.g.*, migrating data and personalized information from one device to another), learning costs (*e.g.*, learning how to use the devices or software of a new supplier), uncertainty costs (*e.g.*, uncertainty about the quality of new products or services), and contractual costs (*e.g.*, discounts on repeat purchases), among others.<sup>374</sup>

162. Switching costs typify and define these markets. When consumers purchase a mobile device, they consider various features of different devices, including price, screen quality, battery life, camera, design, storage, and the pre-installed mobile OS (which could be licensable, like Android, or proprietary, like iOS).<sup>375</sup> This *initial* purchase is therefore also the gateway into the mobile OS ecosystem associated with that mobile device.<sup>376</sup> However, penetration of smartphone usage has increased rapidly over time, and thus, the number of consumers faced with that initial purchase decision is quite low, particularly in the U.S. and other developed countries. For example, in 2014, 67.6% of mobile phone users in the U.S. owned smartphones; by 2020, that figure was forecast to increase to more than 87%.<sup>377</sup> Among those aged 12 to 64, smartphone penetration ranged from 59% to 85% in 2014 and was forecast to range from approximately 93% to more than

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<sup>374</sup> See Klemperer, Paul, “Competition when consumers have switching costs: An overview with applications to industrial organization, macroeconomics, and international trade,” *The Review of Economic Studies*, Vol. 62, No. 4, 1995, pp. 515-539, available at <https://doi.org/10.2307/2298075>, at p. 517-518.

<sup>375</sup> Smartphone purchasers may also be influenced by the brand and OS of the phones purchased by their friends. See Bailey, Michael, Drew M. Johnston, Theresa Kuchler, Johannes Stroebel, and Arlene Wong, “Peer Effects in Product Adoption,” *American Economic Journal: Applied Economics*, July 2022, Vol. 14, No. 3, pp. 488-526, available at <https://www.aeaweb.org/articles?id=10.1257/app.20200367>, at p. 488.

<sup>376</sup> Lockheimer (Google) Deposition, pp. 430-431 (explaining that consumers do not switch between Android and iPhone because “[o]nce a customer gets used to a certain user experience, you know, it takes a lot of energy for someone to say, I’m going to do something else, you know, because they are used to what they are used to” and “if they end up picking iPhone because they thought that provides a simpler experience, they are likely to stay with it because that’s what they are accustomed to.”).

<sup>377</sup> Liu, Cindy, “US Digital Users: The eMarketer Forecast for 2016,” *eMarketer*, February 2016, available at [http://static1.squarespace.com/static/51b949f4e4b0c43b09f8b97f/t/57030153b6aa607cbb9a4ff9/1459814747214/eMarketer\\_US\\_Digital\\_Users-The\\_eMarketer\\_Forecast\\_for\\_2016.pdf](http://static1.squarespace.com/static/51b949f4e4b0c43b09f8b97f/t/57030153b6aa607cbb9a4ff9/1459814747214/eMarketer_US_Digital_Users-The_eMarketer_Forecast_for_2016.pdf) (hereafter “Liu (2016)”), at p. 5.

99% in 2020.<sup>378</sup> As of the first quarter of 2016, the smartphone penetration rate was 87% in Japan, 88% in the US, 88% in Western Europe, and 95% in Canada.<sup>379</sup> In the global market, smartphone penetration rate was approximately 72% in 2018.<sup>380</sup> A survey conducted by Google in 2019 on U.S. adolescent smartphone purchasers shows that the majority (61%) of teenagers obtained their first smartphones (including hand-me-downs) between the ages of 10 and 13 and the age of obtaining the first smartphone is no older than 16.<sup>381</sup>

163. However, once a consumer has made that *initial* purchase and has adopted a mobile ecosystem, mobile device users likely face high “costs” to switch to a different mobile OS for app distribution or in-app content purchases and are therefore reluctant to switch,<sup>382</sup> particularly between Google Android OS and Apple iOS.

b) There are many reasons why consumers do not switch mobile OSs

(1) The Android and iOS ecosystems are incompatible

164. Android and iOS are highly differentiated OSs that are integrated into two separate ecosystems with incompatible software and hardware. Switching smart mobile devices from Android to iOS means moving away from the whole mobile OS ecosystem, with users losing benefits of network externalities enjoyed by other users of platform-exclusive apps.

165. Moreover, as discussed in Section III.B, apps written for one mobile OS are incompatible with a different mobile OS. Thus, consumers cannot buy apps on Android smart mobile devices and then use those apps on an iOS device, and vice versa. There is no way for the consumer to download an app from an Android smart mobile device and then upload it to an iOS device; rather, when switching to iOS, the user would need to re-download the app on their iOS

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<sup>378</sup> Liu (2016), at p. 24.

<sup>379</sup> Google, “360OS Business Plan,” GOOG-PLAY-004530552-567, at 555.

<sup>380</sup> Google, “GTAF Weekly Cadence,” March 19, 2019, GOOG-PLAY4-004915563-582, at 574.

<sup>381</sup> Additionally, 68% of teenagers who do not receive hand-me downs “receive their first brand new smartphone[s]” between the ages of 13 and 17. *See* Google, “Smartphone Parents / Teens Purchase Journey 2019,” April 2019, GOOG-PLAY-002409453.R-534.R, at 459.R-461.R.

<sup>382</sup> Google’s internal document revealed that most likely purchasers of smartphone devices do not consider switching to a different OS. *See* Google, “Android Considerations,” GOOG-PLAY-011119640-686, at 647.

device. Even if a consumer could upload an Android app to an iOS device, the code, designed for Android, would be non-functional on iOS; it could not be installed or operate without modifications to make the app interoperable with iOS. Thus, the choice of iOS as an alternative app distribution channel for consumers would involve the consumer abandoning Android apps in favor of iOS apps and purchasing an Apple device to do so.

(2) Users customize their smart mobile devices and accumulate learning in a certain mobile OS ecosystem

166. Users who stay in a mobile OS and its ecosystem long enough usually customize their devices (*e.g.*, Android phones offer more customization options on home screen and widgets<sup>383</sup>) and also become accustomed to it and accumulate learning about it. For users, switching “feels a lot like learning a new language” as they “not only have to learn how to use a new OS, but completely new platforms around it.”<sup>384</sup> Switching to a new mobile OS ecosystem requires investing time in learning how to use the new ecosystem, reconfiguring the app settings, and becoming accustomed to the new environment.<sup>385</sup>

167. Google internal documents from 2017 and 2019 indicate that switching is not an easy process, noting, for example, that switching phones usually “involves an average of 40 steps and can take as long as 9 hours if [users] use the cloud.”<sup>386</sup> In particular, Android users switching to an iPhone for the first time will have to go through a series of changes such as setting up an Apple ID, getting familiar with Siri, and using AirDrop instead of Bluetooth to transfer files.<sup>387</sup>

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<sup>383</sup> Davidson, Jamie, “Is Android More Customizable Than iOS?” PC-Tablet, January 17, 2022, available at <https://pc-tablet.com/is-android-more-customizable-than-ios/>.

<sup>384</sup> *See, e.g.*, Google, “Pixel switching study,” January 18, 2017, GOOG-PLAY-000880576.R-645.R, at 589.R.

<sup>385</sup> Lockheimer (Google) Deposition, pp. 430-431 (explaining that “[o]nce a customer gets used to a certain user experience, you know, it takes a lot of energy for someone to say, I’m going to do something else, you know, because they are used to what they are used to” and “if they end up picking iPhone because they thought that provides a simpler experience, they are likely to stay with it because that’s what they are accustomed to.”). *See also* Google, “iOS Switchers,” August 2018, GOOG-PLAY-000096813.R-844.R, at 817.R (“42% of iPhone to Android switchers find it difficult to get used to new OS.”)

<sup>386</sup> *See, e.g.*, Google, “Pixel switching study,” January 18, 2017, GOOG-PLAY-000880576.R-645.R, at 589.R. *See also* Google, “Partnering with Google,” GOOG-PLAY4-007931487-501, at 496 (“Among those closed off to switching OS, switching is seen as a cumbersome, painful process.”).

<sup>387</sup> *See, e.g.*, Mehak, “15 insanely handy tips for first-time iPhone users,” *iGEEKSBLOG*, May 23, 2022, available at <https://www.igeeksblog.com/handy-tips-for-first-time-iphone-users/>.

168. I understand that in April 2022, Google launched the “Switch to Android” app, which is available for download on the Apple App Store and designed to facilitate user switching from an iOS to an Android smart mobile device. Even that attempt to facilitate switching with the use of an app has not solved all the data loss concerns that consumers have. For example, as Google instructs the public, iMessage and Facetime must be turned off before completing the switching process to ensure no loss of data.<sup>388</sup> Hiroshi Lockheimer, Senior Vice President responsible for Android at Google, testified that whether consumers use the “Switch to Android” app or switch from iOS to Android in some other way, unless iMessage and Facetime are disabled, those messages and calls will “go to a black hole.”<sup>389</sup> Moreover, the fact that tools have been designed to attempt to eliminate “[b]arriers of [s]witching OS” indicates that the unaided switching process is difficult.<sup>390</sup>

(3) Certain content cannot be used on another mobile OS

169. Because of data and functional incompatibilities across mobile OSs, users who move to a new OS find that important information saved locally (e.g. photos) creates a barrier to switching.<sup>391</sup> Google’s internal survey further notes that “[t]he switching process is more than just moving data from one phone to another.”<sup>392</sup> For example, the Presser Report found that 62% of respondents would worry “[i]f [they] switched to an iPhone,” they “might lose access to photos, phonebooks, or other things [they] now have on [their] phone.”<sup>393</sup>

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<sup>388</sup> Perez, Sarah, “Google’s ‘Switch to Android’ app now officially rolling out,” *Tech Crunch*, April 19, 2022, available at <https://techcrunch.com/2022/04/19/googles-switch-to-android-app-now-officially-rolling-out/> and Android, “Move your stuff from iOS,” available at <https://www.android.com/switch/>.

<sup>389</sup> Lockheimer (Google) Deposition, pp. 443-444.

<sup>390</sup> AT&T, “Samsung Smart Switch,” January 2, 2018, ATT-GPLAY-00005216-220, at 217.

<sup>391</sup> Google, “Operation: Swagger—Android Marketing 2017 Plan,” GOOG-PLAY-000437878.R-908.R, at 890.R (“Surveys show that a key barrier to switching phones (and switching platforms) is having important things saved locally on your old phone - like photos.”).

<sup>392</sup> See, e.g., Google, “Pixel switching study,” January 18, 2017, GOOG-PLAY-000880576.R-645.R, at 607.R.

<sup>393</sup> Presser Report, p. 8.



- (4) Users who switch may have to pay again for apps and content in the new ecosystem<sup>394</sup>

170. When users switch, they may have to re-install apps on the new device (at the risk of losing game progress, for example, and perhaps other in-app content), and the upfront purchase fees for paid apps and costs for in-app purchases may be incurred again.<sup>395</sup> Thus, switching costs increase with a user's desire to replicate on the new device investments in apps and in-app purchases. In addition, Google's internal documents note that "[u]sers with an Android tablet have [REDACTED] This decreases further with an addition of an [A]ndroid TV and [G]oogle [H]ome."<sup>396</sup> In other words, the more devices (*e.g.*, smartphones, tablets, smart home accessories, etc.) a user has in one environment, the higher the cost of switching smartphones (or any one particular device) away from that ecosystem.

- (5) Smartphones are expensive, and carriers and device manufacturers use contracts and promotions to lock in consumers

171. Buying a new smart phone costs a lot of money, typically hundreds of dollars. For example, data from IDC shows that for smartphones sold in 2021 worldwide excluding China, an Android phone cost \$239 on average while an iPhone cost \$967 on average, as depicted in Exhibit 21 below.

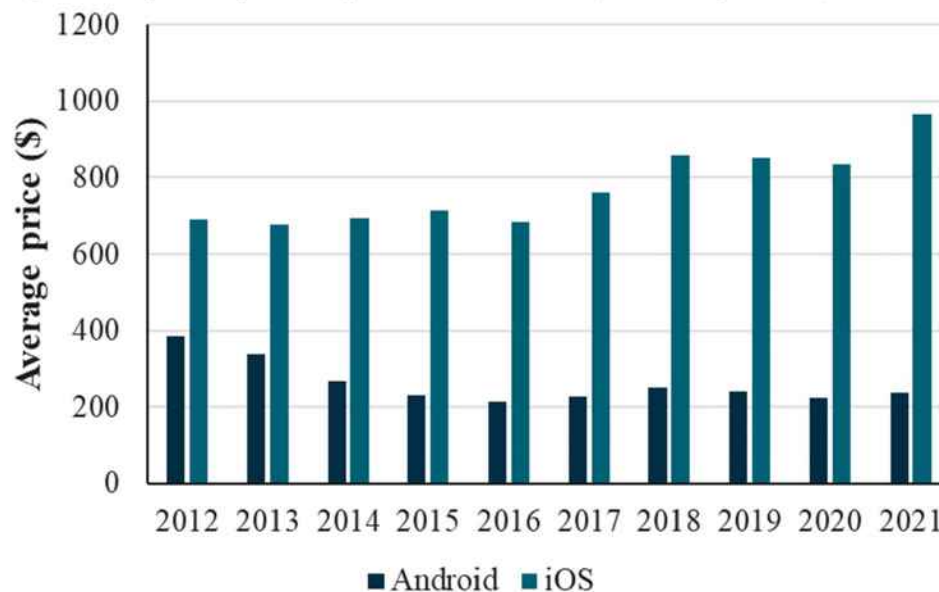
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<sup>394</sup> See, *e.g.*, Huang, Michelle, "Here's why it's so hard to switch from Apple to Android," *Business Insider Australia*, June 10, 2019, available at <https://www.businessinsider.com/apple-to-android-switch-new-phone-stuck-ecosystem-2019-6?r=US&IR=T>.

<sup>395</sup> See Google, "India—Positioning Research (India)," GOOG-PLAY-001043637.R-714.R, at 696.R ("Many participants complained about losing their progress upon switching phones or other reasons."). Even if an app is cross-platform and users can access their account from either OS, it may be that their password and biometric security information is stored on their current device, so switching devices may create a barrier to access accessing some apps. See also Raphael, JR, "iPhone to Android: the ultimate switching guide," *Computer World*, February 7, 2020, available at <https://www.computerworld.com/article/3218067/how-to-switch-from-iphone-to-android-ultimate-guide.html>; and "Defendant's Responses and Objections to State Plaintiffs' Second Set of Requests for Admission," *Epic Games Inc. v. Google LLC et al.*, United States District Court Northern District of California San Francisco Division, Case No. 3:21-md-02981-JD, August 22, 2022, at p. 13 (admitting that "when a user has paid for an app on an ANDROID DEVICE and decides to switch to an iOS DEVICE, and the user further wishes to continue to use the app on the iOS DEVICE, it is possible in some circumstances that an app developer may require a payment to use the app on the iOS DEVICE.").

<sup>396</sup> See, *e.g.*, Google, "US Android -> iOS Switchers Analysis," September 2020, GOOG-DOJ-19768791-817, at 792.

**Exhibit 21**  
**Average smartphone prices by OS, Worldwide (excluding China), 2012 – 2021**



*Note:* The average smartphone price is calculated as the total value divided by the total units for each OS in each year.  
*Source:* IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

172. Consumers must either pay this device cost up front or over time pursuant to an installment plan tied to a wireless contract. More than 50% of U.S. mobile smartphone users are on carriers’ installment contracts that are usually up to 12 or 24 months long.<sup>397</sup> In addition, consumers may obtain benefits (such as trade-in discounts on new devices) by signing service contracts of

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<sup>397</sup> See, e.g., Kunst, Alexander, “What type of contract length is your cellphone contract?” *Statista*, December 20, 2019, available at <https://www.statista.com/statistics/718517/length-of-a-mobile-phone-contract-in-the-us/>; and Kunst, Alexander, “Did you get your smartphone as part of a cellphone contact?” *Statista*, December 20, 2019, available at <https://www.statista.com/statistics/716111/contract-bundled-smartphone-ownership-in-us/>. Additionally, smartphone users are waiting longer to upgrade devices, thereby reducing the percent of smartphone users considering an upgrade at any given time. See, e.g., Ng, Abigail, “Smartphone users are waiting longer before upgrading – here’s why,” *CNBC*, May 17, 2019, available at <https://www.cnn.com/2019/05/17/smartphone-users-are-waiting-longer-before-upgrading-heres-why.html> (“In the U.S. and Europe, especially, the life cycle of a smartphone has been steadily increasing, according to data from market research firm Kantar Worldpanel.”) and Lockheimer (Google) Deposition, pp. 429 (explaining how Apple structures contracts with OEMs to lock in users to iPhone).

varying length.<sup>398</sup> Carrier contracts may include penalties for early termination (*e.g.*, loss of trade-in discounts), which reduce consumers' willingness to change devices within a contract term.<sup>399</sup>

(6) The average Android user spends less on technology

173. Other factors such as consumers' spending behavior for smart mobile devices and related content may also affect their switching decisions. Android users, on average, tend to spend less on smart mobile devices and related content than iOS users. Android phones have a wide variety of models from low budget to high-end, with prices for Android phones ranging from \$156 for a Motorola Moto G Pure to \$1599 for a Samsung Galaxy Z Fold3 5G.<sup>400</sup> While iPhone comes in less expensive models, like the iPhone SE which retails from \$429, Apple mainly targets the premium smartphone market (*e.g.*, iPhone 14 models range from \$799 to \$1199 and iPhone 14 Pro models range from \$999 to \$1599).<sup>401</sup> iPhone users and Android phone users also differ in spending, with iPhone users spending an average of \$50 more per month on tech purchases than Android users (monthly average of \$101 on tech purchases for iPhone users versus \$51 for Android users).<sup>402</sup>

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<sup>398</sup> See, *e.g.*, Verizon, "Device Trade-in Program Terms & Conditions," available at <https://www.verizon.com/support/device-trade-in-program-legal/>.

<sup>399</sup> Verizon, "Cancel your service," available at <https://www.verizon.com/support/residential/account/manage-service/cancel>.

<sup>400</sup> See, *e.g.*, Triggs, Robert, "Did smartphones get a lot more expensive in 2020? Let's look at the numbers," *Android Authority*, December 19, 2020, available at <https://www.androidauthority.com/smartphone-price-1175943/>. See also Johnson, Allison, Gloria Sin, and Dieter Bohn, "The Best Smartphone You Can Buy for under \$500," *The Verge*, August 8, 2022, available at <https://www.theverge.com/21420196/best-budget-smartphone-cheap>. See also Samsung, "Galaxy Z Fold3," available at <https://www.samsung.com/us/smartphones/galaxy-z-fold3-5g/buy/> and T-Mobile, "Motorola Moto G Pure," available at <https://www.t-mobile.com/cell-phone/motorola-moto-g-pure>.

<sup>401</sup> See, *e.g.*, Apple, "Buy Iphone SE," available at <https://www.apple.com/shop/buy-iphone/iphone-se>; Apple, "Buy Iphone 14," available at <https://www.apple.com/shop/buy-iphone/iphone-14>; and Apple, "Buy Iphone 14 Pro," available at <https://www.apple.com/shop/buy-iphone/iphone-14-pro>. See also Silver, Stephen, "Apple Leads in Premium Smartphone Market Share," *The National Interest*, June 25, 2022, available at <https://nationalinterest.org/blog/buzz/apple-leads-premium-smartphone-market-share-203210>.

<sup>402</sup> See, *e.g.*, Comscore, "iPhone Users Earn Higher Income, Engage More on Apps than Android Users," August 14, 2014, available at <https://www.comscore.com/ita/Public-Relations/Infographics/iPhone-Users-Earn-Higher-Income-Engage-More-on-Apps-than-Android-Users>. See also PR Newswire, "iPhone Users Spend \$101 Every Month on Tech Purchases, Nearly Double of Android Users, According to a Survey Conducted by Slickdeals," October 30, 2018, available at <https://www.prnewswire.com/news-releases/iphone-users-spend-101-every-month-on-tech-purchases-nearly-double-of-android-users-according-to-a-survey-conducted-by-slickdeals-300739582.html?c=n>.

(7) Multiple ecosystem purchases enhance ecosystem lock-in

174. Additionally, as consumers make follow-on purchases of hardware (*e.g.*, tablets and smartwatches as well as phone upgrades) and software (*e.g.*, gaming apps and cloud service subscriptions) within the mobile ecosystem, the incompatibility of smart mobile devices across mobile OS ecosystems (such as iPhones and Android phones) creates a “lock-in” effect.<sup>403</sup> For example, the CMA Consumer Survey found 52% of Android smartphone users own at least one other Android/Google product, with 36% owning an Android tablet, and 24% having Google Smart Home devices.<sup>404</sup> Consequently, firms may increase prices to consumers who are locked into their current mobile OS ecosystem, which consumers could not have accounted for when opting into that ecosystem.<sup>405</sup>

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175. Importantly, these switching costs operate together. Some may be more or less important for particular users, but the net effect is to significantly insulate economic decisions purely within one ecosystem—such as, for example, the terms and conditions of app distribution within Android or iOS—from the effect of competition by the other ecosystem and its devices. For the purposes of evaluating the relevant market for Android App Distribution, it does not matter which of these reasons explains the lack of switching; rather, the lack of switching still means that consumers will not switch in response to a price change in Android App Distribution, which delineates the relevant market for Android App Distribution.

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<sup>403</sup> Lockheimer (Google) Deposition, pp. 435-436 (confirming that “one reason a consumer might not switch” between iPhone and Android is that “that they want all their devices to be in the Apple ecosystem” and citing Apple Watch and AirPods as examples of technology that keeps consumers in the Apple ecosystem).

<sup>404</sup> See Accent, “Consumer purchasing behaviour in the UK smartphone market,” June 2022, pp. 33-34, available at [https://assets.publishing.service.gov.uk/media/62a1cb0b8fa8f50395c0a0e7/Consumer\\_purchasing\\_behaviour\\_in\\_the\\_UK\\_smartphone\\_market\\_-\\_CMA\\_research\\_report\\_\\_1\\_.pdf](https://assets.publishing.service.gov.uk/media/62a1cb0b8fa8f50395c0a0e7/Consumer_purchasing_behaviour_in_the_UK_smartphone_market_-_CMA_research_report__1_.pdf) (hereafter “CMA Consumer Survey”).

<sup>405</sup> See Shy, Oz, *The Economics of Network Industries*, Illustrated Edition, Cambridge, UK: Cambridge University Press, 2001, p. 5 (“[I]f consumers are already locked-in using a specific product, firms may raise prices knowing that consumers will not switch unless the price difference exceeds the switching cost to a competing brand.”).

## c) Other economic evidence of switching costs

176. More general economic evidence also confirms the importance of switching costs in users' decisions to change smart mobile devices. Park and Koo (2016), a study on South Korean smartphone users, estimated that users' costs for switching mobile OS is about 202.7 thousand Korean won (c. \$189 in 2014).<sup>406</sup> Park and Koo also explain that when users replace their old smartphones, they tend to choose the same mobile OS. This is because switching costs increase with factors such as the uncertainty about the compatibility of previously purchased applications and uncertainty about the possibility of additional payments after switching. Another study, using a discrete choice model, estimated the willingness to pay for switching OS for users in a European country to be €520 (\$510<sup>407</sup>).<sup>408</sup> These costs are very high relative to the cost of most apps or in-app content.

177. On top of the high costs of switching OS, consumers may face uncertainty about the lifecycle price when buying a smart mobile device, because consumers cannot generally reliably predict the apps and in-app content they may eventually purchase while owning a device.<sup>409</sup> Such uncertainties are compounded by the changes in smart mobile device features over time as well as consumers' changing preferences or how they value certain features and functionalities over others, which makes it even more difficult to predict the lifecycle price when a consumer buys a smart mobile device.<sup>410</sup> This is another reason that the terms and conditions of belonging to one ecosystem or another (such as inflated app prices caused by a lack of competition to distribute apps) will not tend to be disciplined by the behavior of the other ecosystem.

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<sup>406</sup> See, Park, Yuri, and Yoonmo Koo, "An empirical analysis of switching cost in the smartphone market in South Korea," *Telecommunications Policy*, Vol. 40, No. 4, 2016, pp. 307-318, available at <https://doi.org/10.1016/j.telpol.2016.01.004>, at pp. 313-314.

<sup>407</sup> As at September 30, 2022, €1 is equal to \$0.98.

<sup>408</sup> See Grzybowski, Lukasz, and Ambre Nicolle, "Estimating Consumer Inertia in Repeated Choices of Smartphones," *The Journal of Industrial Economics*, Vol. 69, No. 1, 2021, pp. 33-82, available at <https://doi.org/10.1111/joie.12239>, at p. 50.

<sup>409</sup> Google, "Technology Brief," June 15, 2010, GOOG-PLAY-003582582-585, at 582-583 (describes the measurement for "total cost of ownership (TCO)" for smartphone users.).

<sup>410</sup> See Von Weizsäcker, C. Christian, "The costs of substitution," *Econometrica*, Vol. 52, No. 5, 1984, pp. 1085-1116, available at <https://doi.org/10.2307/1910989>, at p. 1089.

d) The Apple App Store does not constrain Android App Distribution

178. In evaluating whether the proposed Android App Distribution Market is a relevant antitrust market, I consider whether the Apple App Store (or other non-Android app stores) are a sufficient substitute for Android app stores. There are several reasons why the Apple App Store does not sufficiently constrain Android App Distribution on smart mobile devices.

e) OEMs cannot pre-install non-Android app stores

179. From an OEM perspective, since non-Android app stores do not function on Android smart mobile devices, OEMs would not – indeed, could not – pre-install a non-Android mobile app store on their Android smart mobile devices.<sup>411</sup> If an OEM wanted to pre-install a non-Android App store, OEMs would first have to change their mobile device to run a non-Android mobile OS. However, this is challenging, as OEMs have limited choice when switching to a non-Android mobile OS.

180. The choices available to OEMs are either to develop their own mobile OS (as Apple and BlackBerry did) or license a third-party mobile OS (the choice made by Samsung and others). For example, Apple uses its own mobile OS, iOS, for its smart mobile devices, whereas Samsung uses Google’s Android mobile OS for its smartphones and tablets.<sup>412</sup> Although OEMs can hypothetically choose to develop their own mobile OSs, few would do so in response to a SSNIP imposed on Android App Distribution. Mobile OSs are characterized by indirect network effects and economies of scale, and thus have high barriers to entry (as discussed in Section VI.A.3).<sup>413</sup>

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<sup>411</sup> For example, developers need to use different coding languages and specialty tools to develop for iOS and Android. See Google, “Developer Tools and Building for Multiple Form Factors,” Q4 2020, GOOG-PLAY-006408321-343, at 322.

<sup>412</sup> See, e.g., Samsung, “How can I check what version of Android I have on my device?” 2022, available at <https://www.samsung.com/uk/support/mobile-devices/how-can-i-check-what-version-of-android-i-have-on-my-device/> (“All Samsung smartphones and tablets use the Android operating system, a mobile operating system designed by Google.”).

<sup>413</sup> In the *United States v. Microsoft Corporation* case, the Court found that the Windows PC OS is protected by high barriers to entry from the consumer side and the developer side, which “would make it prohibitively expensive for a new Intel-compatible operating system to attract enough developers and consumers to become a viable alternative to a dominant incumbent in less than a few years.” See “Court’s Findings of Fact,” *United States v. Microsoft Corporation*, Case No. 98-1232 (TPJ), available at <https://www.justice.gov/atr/us-v-microsoft-courts-findings-fact#ii>, at ¶¶ 30-32.

Moreover, developing a new mobile OS requires significant investments in research and development from designing to testing, which is not only costly but also time-consuming.<sup>414</sup>

181. OEMs would face the catch-22 of having to attract a critical mass of consumers to the OS at the same time as attracting developers to develop and program apps for the alternative mobile OS. Even if the programming of a new OS were surmountable on its own, the OS is not useful without a suite of apps that run on it. Developing *those* apps and APIs for integrations by third parties would be necessary to obtain scale. Now that the iOS and Android ecosystems have virtually saturated the market, as depicted in Exhibit 2 in Section III.A.2, high switching costs and network effects mean that such an effort would be difficult.

182. The other option available to OEMs, which is likely less expensive than developing their own mobile OS, would be to license a mobile OS from a third-party. Because proprietary mobile OSs, such as Apple's iOS and BlackBerry's now defunct mobile OS, are (or were) not available for license to other mobile device OEMs,<sup>415</sup> OEMs must select from the very limited licensable mobile OSs available, a list that is dominated by Google's Android OS, as depicted in Exhibit 4 in Section III.B above.<sup>416</sup>

- (1) Android smart mobile device users also cannot install non-Android app stores

183. I also consider whether Android smart mobile device users could and would install non-Android app stores (*e.g.*, the Apple App Store) in response to a SSNIP on Android App Distribution. Users of Android smart mobile devices, like OEMs, also cannot install a non-Android

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<sup>414</sup> As documented in the EC Google Android Decision, it cost Amazon some "tens of millions of dollars" to develop its own Fire OS (a forked Android OS for Amazon Fire tablets). *See* EC Google Android Decision, ¶ 1039. *See also* TechPinas, "Eight Stages Of Mobile Operating System Development - An Overview For Young Techies," November 25, 2019, available at <https://www.techpinas.com/2019/11/How-To-Create-Mobile-Operating-System.html>.

<sup>415</sup> *See*, EC Google Android Decision, ¶¶ 239-240. The BlackBerry OS was discontinued in 2013, and new BlackBerry devices were based on the Android OS. *See, e.g.*, Bryant, Ben, "BlackBerry 10 Handsets Confirmed for January Launch," *The Telegraph*, November 12, 2013, available at <https://www.telegraph.co.uk/technology/blackberry/9672758/BlackBerry-10-handsets-confirmed-for-January-30-launch.html>.

<sup>416</sup> *See also* EC Google Android Decision, ¶¶ 442-460 (showing the Google Android OS has been a leader in the market for licensable mobile OS in the world excluding China since 2011 with a market share of at least 72.0%).



app store on their Android smart mobile devices because non-Android app stores do not function on Android smart mobile devices – for example, a consumer with a Samsung smartphone cannot download the Apple App Store and attempt to access apps for their Android phone through it.<sup>417</sup>

184. For example, apps designed to run on Android OSs are typically written in Java or Kotlin.<sup>418</sup> Because different Android OSs are based on similar code, it is easy for developers to make an app compatible for users of various Android OSs and distribute them via sideloading. In contrast, iOS apps are typically written in Objective-C or Swift, and developers would need to create two different versions of their app store for users of iOS and Android, which would only function on the respective OS that they were programmed for.<sup>419</sup> Developers of app stores must therefore create two distinct versions of an otherwise identical app store.

185. Consequently, if users of Android smart mobile devices want to switch to a non-Android app store, they would have to switch to a device with a non-Android app store (*e.g.*, an Android user would have to switch to an iPhone). However, as I discuss below, consumers show low propensity to switch to alternative mobile OS ecosystems due to the high costs of switching to a mobile device running an alternative OS. Google has also prevented developers from steering consumers to cheaper distribution methods (as discussed in Section IV.B.5). Therefore, consumers have little or no experience with developers steering them to discounted apps or in-app content.

## (2) User switching among mobile OSs is limited

186. Data reflects that actual switching among mobile OSs is low, which corroborates my analysis of the various reasons why users do not switch. Users show a high degree of adherence to the mobile OS they currently use, and a resistance to switching. For example, the Presser Report conducted in 2022 found that there would be very limited switching between Android and iOS. The

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<sup>417</sup> The Apple App Store (and iOS apps) are largely developed with the Swift programming tools, which is not compatible with the Android development environment. *See* Google, “Developer Tools and Building for Multiple Form Factors,” Q4 2020, GOOG-PLAY-006408321-343, at 326.

<sup>418</sup> *See, e.g.*, Ilyukha, Vitaliy, “How to Port Android Apps to iOS?,” *Jelvix*, available at <https://jelvix.com/blog/porting-android-apps-to-ios>.

<sup>419</sup> *See, e.g.*, Ilyukha, Vitaliy, “How to Port Android Apps to iOS?,” *Jelvix*, available at <https://jelvix.com/blog/porting-android-apps-to-ios>.

Presser Report found that, in response to an increase of five percent on Google Play Store pricing, with Apple App Store prices staying the same, only 3% of respondents said they would switch to an Apple iPhone.<sup>420</sup> Other evidence also indicates limited switching between Android and iOS devices, including Google documents, the CMA Consumer Survey, EC Google Android Decision, and other surveys.

187. First, Google's own evidence of limited switching includes:

- Google's internal analyses show that Android had 86% OS adherence with a purchase cycle of 21 months in 2016,<sup>421</sup> and 90% OS adherence in 2018 and 2019.<sup>422</sup>
- At various times, Google attempted to estimate the "lifetime value" to Google of a user buying an Android smart mobile device. As part of those analyses, Google estimated the likelihood that an Android user would switch to Apple and vice-versa. In 2016, Google engaged survey firms to conduct a study of buyers in the U.S., U.K., Australia, India, and Japan. The survey found that there was an 86% probability of current Android users being retained on Android devices and only an 11% probability of a current iPhone user switching to Android.<sup>423</sup> Google prepared an updated estimate for 2018 which put those figures at 87% and 15%, respectively.<sup>424</sup> Jon Gold, Google's Managing Director for the Platforms & Ecosystems<sup>425</sup> Partnership Strategies, recalled that the rate of switching from iPhone to Android users was "probably lower than" 11% and is in the "single digits."<sup>426</sup>

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<sup>420</sup> Presser Report, p. 8.

<sup>421</sup> Google, "Android Churn Prediction & Prevention," June 20, 2016, GOOG-PLAY-000572041.R-086.R, at 048.R.

<sup>422</sup> Google, "US Smartphone NPS Analysis," November 2018, GOOG-PLAY-004556784.R-813.R, at 793.R and Google, "US Smartphone NPS Analysis," January 2020, GOOG-PLAY-005705974.R-012.R, at 985.R.

<sup>423</sup> Google, "Android Device LTV Overview," November 2, 2016, GOOG-PLAY-006398898.R-909.R, at 902.R.

<sup>424</sup> Google, "Android Device LTV Overview," July 21, 2019, GOOG-PLAY-004503351.R-368.R, at 355.R.

<sup>425</sup> The business unit that includes Google Play.

<sup>426</sup> Gold (Google) Deposition, p. 217 and Email from Brian Rakowski, Google, to Hiroshi Lockheimer, Senior VP of Platforms & Ecosystems for Google, "Subject: Re: Keep," March 13, 2015, GOOG-PLAY-001802727-729, at 728 (internal Google email chain reflecting that the "[n]umber of people who switch from Android -> iOS is small").

- A Google survey of consumers showed the overall Android to iPhone churn rate is approximately [REDACTED] in the US, [REDACTED] in the UK, and [REDACTED] worldwide from 2018 to 2020.<sup>427</sup> Google also notes that additional devices within an ecosystem increase the lock-in to that ecosystem, noting the churn rate is [REDACTED] lower for consumers with an Android tablet and becomes [REDACTED] for Android users with a phone, tablet, TV, and Google Home.”<sup>428</sup>
- Google’s internal analysis indicates lack of switching among Android users, showing that more than 90% of consumers who purchased a new Android phone in the last 12 months during 2018 and 2019 remained with the Android OS.<sup>429</sup> Historically, Google found in 2019 that Apple had a 90% aggregate customer retention rate since 2009.<sup>430</sup>
- A survey on switching commissioned by Google also demonstrated the difficulty of switching, stating “[s]witching is hard, either way you go” and “SWITCHING IS A MARATHON, NOT A SPRINT.”<sup>431</sup> Google further described the “switching user journey” in an internal presentation, stating that “[u]sers ask a variety of questions before switching” and have a “FEAR OF THE UNKNOWN.”<sup>432</sup> Exhibit 22 below is an excerpt from a Google document summarizing results of a consumer survey by Sylvain Labs in which Google highlights the many difficulties associated with switching mobile ecosystems.

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<sup>427</sup> According to Google’s document, the methodology for estimating the churn rate is Lasso logistic regression with the time period being “L3Y” and the sample being “ME switcher data.” See, Google, “US Android -> iOS Switcher Analysis,” September 2020, GOOG-DOJ-19768791-817, at 792. See also Google, “GB Android -> iOS Switcher Analysis,” January 2021, GOOG-DOJ-27418506-510, at 507. See, for example, a description of Lasso Regression, Glen, “Lasso Regression: Simple Definition,” *StatisticsHowTo*, available at <https://www.statisticshowto.com/lasso-regression/>.

<sup>428</sup> See Google, “US Android -> iOS Switcher Analysis,” September 2020, GOOG-DOJ-19768791-817, at 799.

<sup>429</sup> See Google, “US Smartphone NPS Analysis,” November 2018, GOOG-PLAY-004556784-813.R, at 793.R. See also Google, “US Smartphone NPS Analysis,” August 2019, GOOG-PLAY-005607169.R-207.R, at 180.R.

<sup>430</sup> Google, “iOS Switchers,” August 2018, GOOG-PLAY-000096813.R-844.R, at 840.R.

<sup>431</sup> See, e.g., Google, “Pixel switching study,” January 18, 2017, GOOG-PLAY-000880576.R-645.R, at 606.R and 616.R.

<sup>432</sup> Google, “Switching to Pixel,” January 31, 2017, GOOG-PLAY- 007317466-520, at 467 and 473.

## Exhibit 22

### Google Recognizes Many Difficulties of Switching Mobile Ecosystems



Source: Google, "Pixel switching study," January 18, 2017, GOOG-PLAY-000880576.R-645.R, at 589.R.

188. Second, the CMA as part of their Mobile Ecosystems Market Study undertook a study into consumer purchasing behavior in the UK smartphone market.<sup>433</sup> This survey showed that only 5% of Android users had switched from an iOS device with their most recent Android smart mobile device purchase (while 8% of iOS users switched from an Android with their most recent iPhone purchase).<sup>434</sup> In addition, of those who had not switched, only 12% of Android users even *considered* buying/getting an iPhone.<sup>435</sup> The survey also found:

- The most important factors for Android users in their decision to buy their current smartphone were screen size and quality (56%), overall price (54%), and battery life (51%). Only 15% chose range and quality of mobile apps available on the device, and 11% chose price of subscriptions/content for apps available on the device.<sup>436</sup>

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<sup>433</sup> CMA Consumer Survey, p. 1.

<sup>434</sup> CMA Consumer Survey, Figure 16.

<sup>435</sup> CMA Consumer Survey, Figure 24.

<sup>436</sup> CMA Consumer Survey, Figure 5.

- The top reasons why Android users didn't consider switching to an iPhone were: Too expensive (60%); I am happy with/prefer Android (54%); and I identify more closely with Android than iOS (44%).<sup>437</sup> The survey also identified some potential barriers to switching including "I didn't want to spend the time learning how to use an iPhone" (28%), "Because I have other devices linked to my phone/operating system (Android)" (25%), and "I felt it would be too much hassle to switch to an iPhone" (18%).

189. Third, the EC Google Android Decision concluded that Android users are unlikely to switch between Android and iOS, citing evidence from the Yandex Survey<sup>438</sup> that over 90% of Android users in the UK were likely to continue purchasing a new Android smartphone.<sup>439</sup> The EC Google Android decision also refuted Google's claims that "a substantial number of users have switched, or would be willing to switch" or that "the degree of competition for first time buyers of smart mobile devices would be sufficient to protect existing Android smart mobile device users."<sup>440</sup>

190. Finally, other survey evidence suggests there is limited substitution between Android and iOS devices.

- BankMyCell, a price comparison website for electronics recycling, collected data from 38,043 consumers who traded in their phones from October 2018 to June 2019. They found that 12.4% of iPhone owners traded their phones for Samsung smartphones and 6.4% for LG smartphones, whereas only 7.7% of Galaxy S9 users switched to an iPhone (with 92.3% remaining on the Android OS).<sup>441</sup>

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<sup>437</sup> CMA Consumer Survey, Figure 27.

<sup>438</sup> See EC Google Android Decision, ¶ 533.

<sup>439</sup> See EC Google Android Decision, ¶¶ 533-534.

<sup>440</sup> See EC Google Android Decision, ¶¶ 535-551.

<sup>441</sup> This survey is based on a dataset containing 38,043 unique Apple iPhone users (of which 26,724 unique iPhone users with defined smartphone models) and 468 unique users in the Galaxy comparison study. The survey's online audiences are 62.4% millennials and 37.6% aged 36-65, with a nearly 6:4 female to male split. See Turner, Ash, "iPhone Brand Loyalty Study at Trade-in," *BankMyCell*, available at <https://www.bankmycell.com/blog/iphone-trade-in-loyalty-study/>.

- The adherence rate of Android and iOS users in the U.S. continued to rise in 2017 with only 9% of Android users switching to iOS.<sup>442</sup>
- The Presser Report found that between 71% and 78% of respondents believe it would take “a lot” or “some” effort to switch from Android to iOS.<sup>443</sup>

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191. I therefore conclude that consumers face high costs if they wish to switch from Android to iOS, or vice versa, and that in reality consumers who already own a smart mobile device – the vast majority of consumers, as noted above – tend to adhere to their present OS when purchasing a new smart mobile device. This is evidence that the terms and conditions of distribution of Android apps are not constrained by competition from the Apple App Store. In sections that follow, I also consider whether other alternative app distribution methods, such as non-Android mobile device app stores, app stores on PCs or gaming consoles, or web-based apps, are sufficient constraints such that the market is wider than Android App Distribution.

(3) Developers’ incentive to multi-home does not constrain Android App Distribution

192. Potential switching by developers also does not constrain Android App Distribution. App developers want to reach as many device users as possible. Mobile device users tend to use either Android or iOS devices (and very rarely multi-home/use both).<sup>444</sup> Developers therefore view Android and non-Android app distribution channels as complements, rather than substitutes.<sup>445</sup>

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<sup>442</sup> See, e.g., Jones, Chuck, “Apple’s iOS Loyalty Rate Is Lower Than Google’s Android, But Apple May Steal More Users Each Year,” *Forbes*, March 10, 2018, available at <https://www.forbes.com/sites/chuckjones/2018/03/10/apples-ios-loyalty-rate-is-lower-than-googles-android-but-apple-may-steal-more-users-each-year/?sh=2208012a68a8>.

<sup>443</sup> Presser Survey, p. 8.

<sup>444</sup> CMA Final Report on Mobile Ecosystems, ¶ 3.40.

<sup>445</sup> Chu (Meta Platforms (formerly Google)) Deposition, p. 46 (“Q So you wrote about how to differentiate the store because you believe that developers would have a choice to develop for iOS or for Android, and you wanted to attract as many of those developers to choose Android, correct? A Developers always have a choice to develop -- to develop for any of these mobile platform[s], either in all of them, some of them, or only one of them. And it was our job to convince them why it was worth their while to develop to Android. Whether they developed elsewhere or not, it is up to them”).

Therefore, as described in Section III.B, app developers have strong incentives to multi-home by making their apps available for Android and iOS, in order to harness the volume and value of users on each mobile OS.<sup>446,447</sup> Multi-homing is especially important for apps that facilitate interactions among users, such as apps with a social networks component.

193. This is further confirmed by a Google sponsored survey on app developers' decision to develop for a mobile OS, which found that "the demand (or expected demand) for and profitability of developing applications for a platform are by far the most important drivers of decisions to develop applications for a platform."<sup>448</sup> As stated in the survey, these findings "are consistent with other studies of application developers' decision making and with Google's recognition (as reflected in internal documents) that the volume of developed applications is largely driven by the number of Android users."<sup>449</sup>

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194. In summary, I conclude that the possibility that OEMs might adopt a different, non-Android operating system does not constrain the behavior of Android app distributors. I similarly conclude that Android users cannot constrain Android app developers by installing a non-Android app store on Android smart mobile devices. Finally, the possibility of developers developing apps for Apple's App Store, or some other non-Android store, does not constrain the behavior of Android app distributors.

f) Basic or feature phones are not a substitute for Android App Distribution

195. I do not consider basic or feature phones part of the Android App Distribution Market, as they lack the features, capabilities, and app functionality of smart mobile devices and,

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<sup>446</sup> Varian, Hal, "Concentration, Competition, and Entry," GOOG-PLAY4-006018159-187, at 177 ("Developers face strong incentives to multihome[.] ... This is true even for developers of the most popular apps[.]").

<sup>447</sup> For example, the EC found that developers produce apps for 2.2 OSs (non-games) and 2.6 OSs (games) on average. See EC Google Android Decision, ¶ 554.

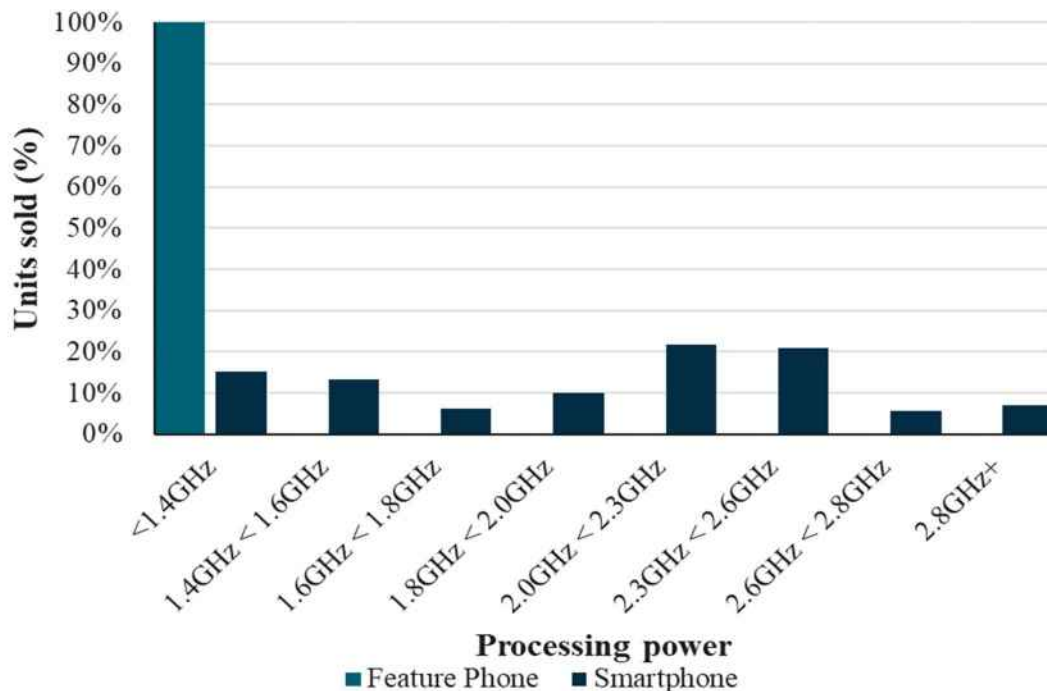
<sup>448</sup> See Google, "Report of Dr. Itamar Simonson," February 8, 2016, GOOG-PLAY-007317611-634 (hereafter "Simonson Report"), at 614.

<sup>449</sup> See Simonson Report, 615.



thus, Android smart mobile device users, who have chosen to purchase a smart mobile device, would not switch to these basic devices in response to a small, significant non-transitory price increase on Android App Distribution. As explained above in Section III.A.1, these non-smart mobile devices merely offer simple services such as voice calling, text messaging, and limited web browsing. Feature phones also lack the processing power memory capability of smart mobile devices. As shown in Exhibit 23 below, all feature phones have processor speeds less than 1.4GHZ, while on average from 2017 to 2021, more than half of smartphones had speeds greater than 2GHZ.

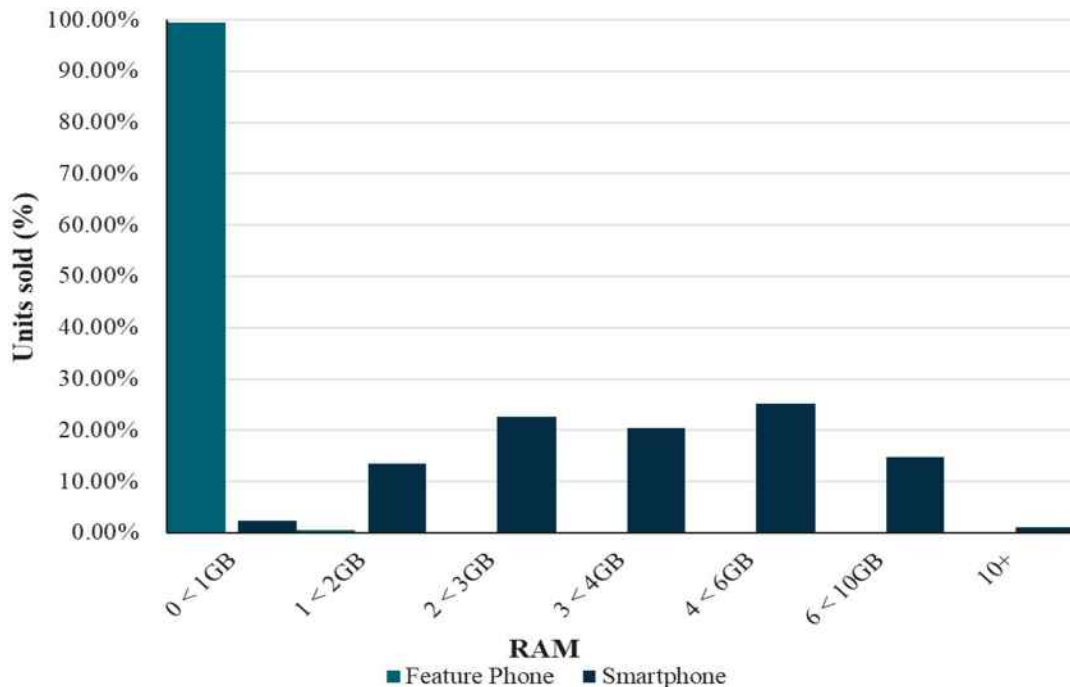
**Exhibit 23**  
**Processor Power of Feature Phones and Smartphones,**  
**Worldwide (excluding China), 2017 – 2021**



*Source:* IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

196. In addition, as shown in Exhibit 24 below, feature phones have much lower random-access memory (RAM) than smartphones. From 2017 to 2021, all feature phones had on average less than 2GB (and 99% less than 1GB), while more than half of smartphones had RAM above 3GB.

**Exhibit 24**  
**RAM in Feature Phones and Smartphones,**  
**Worldwide (excluding China), 2017 – 2021**



Source: IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

197. Therefore, based on the differences in functionality and capability (including the processor speed and memory available), I do not consider basic and feature phones to be in the same market as smart mobile devices.

g) App stores on PCs or gaming consoles are not a substitute for Android App Distribution

198. I also find App stores on PCs or gaming consoles are not a substitute for Android App Distribution, due to several differences between their apps and OSs.

(1) OEMs cannot substitute PC or console App Distribution for Android App Distribution

199. From an OEM perspective, technical standards mean OEMs of smart mobiles devices cannot install OSs (and therefore app stores) for PCs or gaming consoles on their smart

mobile devices.<sup>450</sup> I understand that gaming consoles are designed for a very specific purpose and therefore the OSs that are developed for them are bespoke and not suitable for general purpose applications.<sup>451</sup> In addition, I understand that PC OSs, while more general in purpose, are not designed for smart mobile devices, which have smaller screens, focus on wireless functionality, and run on very different hardware, as noted by smartphone OEMs, such as Samsung and Nokia:<sup>452</sup>

Smart mobile device OSs constitute a separate market from PC and Desktop OSs. Smart mobile device OSs are customized for smaller screen sizes, mobile functions, wireless functions, and apps that are better suited for simpler mobile devices rather than PC OSs, which are designed for higher performance CPUs and larger screens, and greater drive storage capabilities.

...

The hardware requirements for a mobile OS are significantly different from a PC[']s OS *e.g.*, in terms of processors, memory, display, and power management. In most cases, the applications developed in the mobile environment are also specific to the mobile domain and not shared with the PC environment, and vice versa.

(2) App usage and user experience differ for PCs and game consoles and smart mobile devices

200. Smart mobile devices have replaced PCs and gaming consoles for various purposes that make use of smart mobile devices' portability (*e.g.*, maps, social media, or dating apps) or their unique hardware (*e.g.*, motion-based navigation). Apps serving these functions often have little to no value on desktop computers or gaming consoles. Apps that are designed with the unique hardware of smart mobile devices in mind (*e.g.*, touch screens, accelerometers, or gyroscopes) also often do not function with a mouse or video game controller used with PC and gaming console

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<sup>450</sup> See, *e.g.*, Java T Point, "Difference between Mobile Operating System and Desktop Operating System," available at <https://www.javatpoint.com/mobile-operating-system-vs-desktop-operating-system#:~:text=Mobile%20OS%20handles%20cellular%20and,includin%20mouse%2C%20keyboard%2C%20etc.>

<sup>451</sup> See, *e.g.*, Yordanov, Alexander, "How the new generation of consoles will affect PC Gaming," Sapphire Nation, January 28, 2021, available at <https://www.sapphirenation.net/how-the-new-generation-of-consoles-will-affect-pc-gaming> ("Console operating systems are optimized exclusively for gaming, so it will take a PC CPU that is significantly faster to guarantee superior performance[.]"); and Brightwhiz, "Get the Scoop on PC vs Console Gaming," December 16, 2016, available at <https://brightwhiz.com/pc-vs-console-gaming/> ("Gaming consoles usually have optimized operating systems and internal applications designed specifically for one thing or one set of things. The PC, on the other hand, hosts a general purpose operating system.").

<sup>452</sup> See EC Google Android Decision, ¶ 223.

apps, and vice versa.<sup>453</sup> A large proportion of consumers also predominantly use certain services via mobile apps, including instant messages (88%), dating (85%), weather (81%), maps/GPS/traffic (76%), and food (76%).<sup>454</sup> Also, during 2020, a new app category of Covid-tracing or symptom tracking apps emerged, services that were only available via mobile.<sup>455</sup> Consumers are also increasingly attached to smart mobile devices thanks to the convenience of using them whenever and wherever; for example, in 2021 Americans spent an average of 4.1 hours daily on mobile devices.<sup>456</sup>

201. PCs and gaming consoles have vastly different characteristics than smart mobile devices and are generally not substitutable for one another. Desktop PCs and most gaming consoles are large, heavy devices that generally stay in one place. While laptop computers can be carried from place to place, they generally require a stable resting place for access. Smartphones, on the other hand, are slender gadgets that can be slipped into a pocket and accessed in myriad circumstances, including while walking, waiting in a meeting, or riding transit. A consumer who wants to access digital content “on the go” typically cannot switch to a gaming console or PC if the terms of accessing that content on the smartphone change.<sup>457</sup> For example, while ride sharing apps such as Uber or Lyft allow a user to book a trip on a PC, the web-based app cannot track the car’s

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<sup>453</sup> Google, “Play Sandbox,” 2021, GOOG-PLAY-000338400.R-552.R, at 484.R (“Getting the best PC/Console games onto mobile requires a controller[.] On mobile you can count only on touch[.]”).

<sup>454</sup> See, e.g., Comscore, “Global State of Mobile,” 2019, available at <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2019/Global-State-of-Mobile>, at p. 8.

<sup>455</sup> See, e.g., Comscore, “Global State of Mobile,” November 2020, available at [https://www.comscore.com/content/download/51336/2998036/file/2020\\_Global\\_State\\_of\\_Mobile.pdf](https://www.comscore.com/content/download/51336/2998036/file/2020_Global_State_of_Mobile.pdf), at p. 9.

<sup>456</sup> See Data.ai, “State of Mobile 2022,” 2022, available at <https://www.data.ai/en/go/state-of-mobile-2022/>, at p. 6 (“Users in Brazil, Indonesia and South Korea surpassed 5 hours per day in mobile apps in 2021. The average American watched 3.1 hours of TV a day, whereas they spent 4.1 hours on their mobile device in 2021”).

<sup>457</sup> It does not change my opinion that, at the margins, a very large tablet may have similar characteristics to a very small laptop. Tablets make up only a tiny (9.7%) portion of the Android ecosystem, and the possible substitutability of laptops and Android tablets for certain use cases would not affect the calculus of a hypothetical monopolist of Android app distribution. The proportion of Android installment by tablet over Android installment by smartphone and tablet as at December 2016 was approximately 9.7%, which is calculated as 185/(185+1,719). See Google, “Android Staples,” February 11, 2017, GOOG-PLAY-000570075.R-124.R, at 078.R.

location and arrival time while waiting outside.<sup>458</sup> That is why [REDACTED] data shows that [REDACTED] of the time consumers spent using [REDACTED] was with the native app (with just [REDACTED] of time spent with the “domain” – *i.e.*, web app).<sup>459</sup> Additionally, social media apps such as Facebook, Snapchat, and Instagram are almost exclusively used on smartphones.<sup>460</sup> Comscore found that smartphones made up 92% of the time users spend on social media apps.<sup>461</sup>

202. Finally, dating apps are designed specifically for smart mobile devices due to their portability and GPS functions.<sup>462</sup> Comscore data from 2020 shows that 85% of users were using dating apps exclusively through smart mobile devices.<sup>463</sup> Additionally, [REDACTED] [REDACTED] [REDACTED]<sup>464</sup>) data shows that during 2020, only [REDACTED] of monthly active users used the web/web app, while the remaining [REDACTED] users accessed via a smart mobile device app (either Android or iOS).<sup>465</sup> Thus, distribution of apps on PCs and gaming consoles is not a substitute for, and would not constrain, Android App Distribution.

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<sup>458</sup> Lyft noted specifically on its website that transit information is not available from a web browser. *See*, for example, Lyft, “How to request a ride,” available at <https://help.lyft.com/hc/e/all/articles/115013079988-How-to-request-a-ride#r4o>.

<sup>459</sup> *See* Rysman Workpapers.

<sup>460</sup> Garcia, Rodora, “What Are The Types Of Social Media Apps?” *Cellular News*, July 22, 2022, available at <https://cellularnews.com/mobile-apps/what-are-the-types-of-social-media-apps/>.

<sup>461</sup> Comscore, “Global State of Mobile,” 2019, available at <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2019/Global-State-of-Mobile>, at p. 11.

<sup>462</sup> Chuks, Rebecca, “The power of proximity: how location data affects your love life,” *Here*, February 14, 2020, available at <https://www.here.com/company/blog/location-intelligence-dating-apps> and Castro, Angel and Juan R. Barrada, “Dating Apps and Their Sociodemographic and Psychosocial Correlates: A Systematic Review,” *Int J Environ Res Public Health*, Vol. 17, No. 18, September 2020, available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7557852/pdf/ijerph-17-06500.pdf>, at p. 17.

<sup>463</sup> “Comscore, “Global State of Mobile,” November 10, 2020, available at <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2020/Global-State-of-Mobile>, at p. 6.

<sup>464</sup> Dixon, S., “Most popular dating apps worldwide as of May 2021, by number of monthly downloads,” *Statista*, April 28, 2022, available at <https://www.statista.com/statistics/1200234/most-popular-dating-apps-worldwide-by-number-of-downloads/>.

<sup>465</sup> *See* Rysman Workpapers.

203. Consumers also purchase gaming consoles for a very particular purpose (*i.e.*, playing games), while smart mobile devices have a much wider functionality than gaming.<sup>466</sup> This explains why many Android users already own all three types of devices (a smartphone, PC, and gaming console). For example, the CMA Consumer Survey found that 65% of Android users owned a personal windows laptop/desktop computer, and 34% owned a gaming console.<sup>467</sup> Further, if the consumer had an Android smart mobile device but did not already have a PC or gaming console, they would have to purchase new hardware to access the alternative app distribution methods, further lowering the likelihood they would switch. The types of games on mobile platforms and non-mobile platforms are also different in a way that mobile games tend to be casual games that appeal to mass audiences, whereas PC and console games have higher quality, offer a more immersive experience and attract more dedicated gamers.<sup>468</sup> Moreover, a comparison of the top 45 apps on the Google Play Store and Steam show almost no overlap; I found only three apps were on both, as depicted in Exhibit 25 below.

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<sup>466</sup> Barder, Ollie, “Millions Of Gamers Are Still Buying Consoles, Here Is Why,” *Forbes*, February 10, 2015, available at <https://www.forbes.com/sites/olliebarder/2015/02/10/millions-of-gamers-are-still-buying-consoles-here-is-why/?sh=73bef8d76dc5>.

<sup>467</sup> See CMA Consumer Survey, Figure 21.

<sup>468</sup> See, *e.g.*, Starloop Studios, “Mobile Games Vs. PC Vs. Console Games: What Market is the Best Bet?” available at <https://starloopstudios.com/mobile-games-vs-pc-vs-console-games-what-market-is-the-best-bet/#:~:text=Mobile%20games%20offer%20users%20the,console%20games%20are%20the%20winner>.

**Exhibit 25**  
**Point-in-Time Comparison of Top Apps on Google Play Store and Steam Store**

<b>Rank</b>	<b>Steam (24-Hour Peak)</b>	<b>Google Play - Free (Current)</b>	<b>Google Play - Paid (Current)</b>
1	Counter-Strike: Global Offensive	Power of Women: Genesis	Minecraft
2	Dota 2	Survivor.io	Geometry Dash
3	Apex Legends	Stumble Guys	Bloons TD 6
4	PUBG: BATTLEGROUNDS	Save the Doge	Rovio Classics: AB
5	Lost Ark	Stick War: Hero Tower Defense	Stardew Valley
6	Grand Theft Auto V	Pull the Pin	MONOPOLY - Classic Board Game
7	NARAKA: BLADEPOINT	Roblox	Terraria
8	Destiny 2	Epic Heroes- Save Animals	Grand Theft Auto: San Andreas
9	Team Fortress 2	Crowd Evolution!	DraStic DS Emulator
10	Wallpaper Engine	2248 - Number Puzzle	My Boy! - GBA Emulator
11	Rust	School Party Craft	Grand Theft Auto: Vice City
12	Cyberpunk 2077	Draw Monster 3D	Mini Metro
13	Football Manager 2022	Basket Battle	Poppy Playtime Chapter 2
14	War Thunder	Stormshot	Incredibox
15	ARK: Survival Evolved	Woodoku	Papers, Please
16	Unturned	Tall Man Run	Poppy Playtime Chapter 1
17	Warframe	Become a Queen	Inron Marines Invasion
18	Tom Clancy's Rainbow Six Siege	Rainbow Friends, Rope Game	The Game of Life 2
19	Total War: WARHAMMER III	Lifting Hero	Five Nights at Freddy's
20	FIFA 22	Fill The Fridge	Slay the Spire
21	Sid Meier's Civilization VI	Truckers of Europe 3	The Room
22	Dead by Daylight	Madden NFL 23 Mobile Football	Poly Bridge
23	DayZ	Subway Surfers	Bloons TD 5
24	Rocket League	Bridge Race	Wingspan: The Board Game
25	MIR4	Going Balls	The House of Da Vinci 3
26	PAYDAY 2	Merge Monster: Rainbow Friends	2112TD: Tower Defense Survival
27	New World	Royal Match	Dawncaster: Deckbuilding RPG
28	Yu-Gi-Oh! Master Duel	Coffee Stack	Papa's Freezeria To Go!
29	FINAL FANTASY XIV Online	Rainbow Craft: Hide and Seek	Pizza Boy GBA Pro
30	Path of Exile	Count Masters: Stickman Games	The Game of Life
31	Euro Truck Simulator 2	Craft World - Master Block 3D	Bad North: Jotunn Edition
32	Hearts of Iron IV	Parking Jam 3D	Hitman Sniper
33	The Scroll Of Taiwu	Wordscapes	Ultimate Custom Night
34	ELDEN RING	Collect Em All! Clear the Dots	True Skate
35	MONSTER HUNTER RISE	Candy Crush Saga	Five Nights at Freddy's 2
36	World of Tanks Blitz	Uboat Attack	Pocket City
37	Farming Simulator 22	Tap Away	Exploding Kittens - Official
38	Garry's Mod	8 Ball Pool	My OldBoy! - GBC Emulator
39	Terraria	Rope and Demolish	Poly Bridge 2
40	Source SDK Base 2007	Cyber Surfer: Beat&Skateboard	Human : Fall Flat
41	Europa Universalis IV	Button Fever	Grand Theft Auto III
42	Conan Exiles	Zombie Defense	RFS - Real Flight Simulator
43	Stardew Valley	Township	ScourgeBringer
44	Stumble Guys	Lunch Box Ready	Where's My Water?
45	Spacewar	Super Dragon Hero Game	RollerCoaster Tycoon Classic

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*Notes:*

1. This exhibit depicts the top 45 games in the Steam Store and the Google Play Store at 11:13am on September 21, 2022. I understand the Steam Store rankings are global, while the Google Play Store rankings might vary across different geographies. This exhibit depicts the Google Play Store rankings as they appear in the U.S.
2. Column “Steam (24 Hour Peak)” depicts the top 45 apps available in the Steam Store based on the 24-hour peak number of players (see column “24h Peak” in source 2).
3. Column “Google Play – Free (Current)” depicts the top 45 free phone game apps available in the Google Play Store and column “Google Play – Paid (Current)” depicts the top 45 paid phone game apps in the Google Play Store. These top apps update frequently throughout the day to reflect current top apps. Google Play does not specify the metrics utilized to categorize apps as “top”; however, this is likely based on downloads.

*Sources:*

1. Google, “Games,” Google Play Store, available at <https://play.google.com/store/games>.
2. Steam, “Most Played Games,” *SteamDB*, available at <https://steamdb.info/graph/>.

204. Additionally, the volume of gaming apps on the Play Store overwhelmingly surpasses that on gaming consoles such as Steam, Switch, and PlayStation. There were approximately 478,000 gaming apps available on the Play Store as of the second quarter of 2022. In contrast, the number of games on Steam, Switch, and PlayStation is approximately 50,000 thousand, 5,000, and 4,000, respectively.<sup>469</sup> Therefore, from a consumer perspective, PCs or gaming consoles cannot be considered as reasonable substitutes for smart mobile devices.

(3) App developers do not consider PC or console app distribution and Android App Distribution as substitutes

205. In addition to limited substitution from consumers and OEMs, as discussed above, developers also would not substitute from Android App Distribution to PC or console app distribution. From developers’ perspective, OSs for PCs and game consoles have technically different requirements from mobile OSs, so the apps developed for different platforms must accommodate these different specifications. OS developers such as Nokia, for example, have stated

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<sup>469</sup> See Clement, J., “Number of available gaming apps in the Google Play Store from 1st quarter 2015 to 2nd quarter 2022,” *Statista*, August 30, 2022, available at <https://www.statista.com/statistics/780229/number-of-available-gaming-apps-in-the-google-play-store-quarter/>; Wise, Jason, “How many games are there on Steam in 2022?” *Earthweb*, August 5, 2022, available at [https://earthweb.com/how-many-games-are-on-steam/#:~:text=This%20makes%20us%20all%20wonder,list%20every%20year%20since%202017.](https://earthweb.com/how-many-games-are-on-steam/#:~:text=This%20makes%20us%20all%20wonder,list%20every%20year%20since%202017.;); Nintendo, “Nintendo Switch,” available at <https://www.nintendo.com/switch/system/>; and Adler, Matthew, “PS5: ‘Majority of the 4,000+ PS4 Titles’ Will be Backwards Compatible, Sony Says,” *IGN*, March 27, 2020, available at <https://www.ign.com/articles/ps5-majority-of-the-4000-ps4-titles-will-be-backwards-compatible-sony-says>.

that because the “hardware requirements for a mobile OS are significantly different from a PCs,” mobile apps are “specific to the mobile domain and not shared with the PC environment, and vice versa.” Similarly, Amazon stated that “apps developed for a mobile OS may not function (or may not function as well) on a device using an OS for PCs (and vice versa).”<sup>470</sup>

206. Generally speaking, apps developed for mobile OSs are able to handle cellular/wireless connectivity and use touchscreens.<sup>471</sup> In contrast, PC and console OSs have a higher power requirement (*e.g.*, PC OSs are generally not optimized for power usage and have a high requirement for CPU capacity) and support many input devices (*e.g.*, computer mice, game controllers, headphones, microphones, etc.), so PC software is usually developed for specific purposes (*e.g.*, system software and programming software).<sup>472</sup>

207. Games are also developed differently for these different platforms (though cross-platform games are increasing<sup>473</sup>). For example, games on smart mobile devices are usually lower quality, have limited genres (due to smaller screens), generally do not support external controllers, and damage the battery compared to games on PCs or gaming consoles, which have higher resolution and faster gaming speeds.<sup>474</sup> Also, as discussed in Section III.B, developers who do not currently develop their apps on PC/consoles, would have to incur additional expense writing code and building their app in a different environment (and consoles would only be applicable for gaming developers). Finally, in 2021, according to WePC, the smartphone and tablet games market

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<sup>470</sup> See EC Google Android Decision, ¶¶ 221-223.

<sup>471</sup> See, *e.g.*, Java T Point, “Difference between Mobile Operating System and Desktop Operating System,” available at <https://www.javatpoint.com/mobile-operating-system-vs-desktop-operating-system#:~:text=Mobile%20OS%20handles%20cellular%20and,includin%20mouse%2C%20keyboard%2C%20etc>.

<sup>472</sup> See, *e.g.*, Java T Point, “Difference between Mobile Operating System and Desktop Operating System,” available at <https://www.javatpoint.com/mobile-operating-system-vs-desktop-operating-system#:~:text=Mobile%20OS%20handles%20cellular%20and,includin%20mouse%2C%20keyboard%2C%20etc> and Wilcox, Lacey, “The 4 Main Types of Software,” *Primitive*, March 30, 2021, available at <https://www.leadwithprimitive.com/blog/the-4-main-types-of-software>.

<sup>473</sup> See, *e.g.*, Conroy, Shaun, “Cross platform games & crossplay games explained 2022,” *WePC*, August 16, 2022, available at <https://www.wepc.com/tips/cross-platform-games/>.

<sup>474</sup> See, *e.g.*, Starloop Studios, “Mobile Games Vs. PC Vs. Console Games: What Market is the Best Bet?” available at <https://starloopstudios.com/mobile-games-vs-pc-vs-console-games-what-market-is-the-best-bet/#:~:text=Mobile%20games%20offer%20users%20the,console%20games%20are%20the%20winner>.

was worth more than the console and PC games markets combined (with 51.6% of the total games market).<sup>475</sup> Therefore, smart mobile device apps have become far too substantial for gaming developers to ignore and switch to developing only PC and/or console games. In summary, developers face many hurdles when substituting between developing apps for smart mobile devices and developing apps for PCs and gaming consoles.

208. As described in Section VII.B.3, app stores on PCs, such as the Microsoft Store and the Epic Games store, often charge a commission of 12%.<sup>476</sup> This is much lower than Google's average commission of 29.85%.<sup>477</sup> The fact that this difference persists (*i.e.*, Google has not materially adjusted its pricing in response to these lower fees) suggests developers see Android App Distribution (and the Google Play Store in particular) as a unique/separate distribution platform that is not subject to competition from these PC app stores.

209. Finally, PC/console app distribution may compete more closely with Android App Distribution if many apps and games worked across all three platforms (also referred to as "cross-platform").<sup>478</sup> However, a Google internal document suggests that cross-platform gaming is rare (in mid-2019 Fortnite and Rocket League were the only cross-platform games on the PS4).<sup>479</sup> Even among gaming apps that can be played cross-platform, there is limited multi-homing by users. For example, among gamers of [REDACTED] one of the most popular [REDACTED] only [REDACTED] played the game on multiple platforms in January 2021 and that proportion decreased to [REDACTED] in October 2021.<sup>480</sup> On the other hand, Google and Amazon (*i.e.*, mobile focused companies) would

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<sup>475</sup> See WePC, "PC Gaming Statistics 2022," June 10, 2022, available at <https://www.wepc.com/statistics/pc-gaming/>.

<sup>476</sup> See Warren, Tom, "Microsoft shakes up PC gaming by reducing Windows store cut to just 12 percent," *The Verge*, April 29, 2021, available at [www.theverge.com/2021/4/29/22409285/microsoft-store-cut-windows-pc-games-12-percent](http://www.theverge.com/2021/4/29/22409285/microsoft-store-cut-windows-pc-games-12-percent).

<sup>477</sup> This is averaged across all developers who have incurred transactions with U.S. consumers from January 2012 to July 2021. See Google Transaction Data. See Rysman Workpapers.

<sup>478</sup> Cross-platform is "a term used to refer to a piece of software that is compatible with more than one system. For example, the popular media player VLC is compatible with the three major desktop operating systems: Microsoft, Mac OS, and Linux. Cross-platform support can also extend to mobile devices, with many apps available on both the Apple App Store and the Google Play Store." See Vicente, Vann, "What does cross-platform mean for gaming and other apps?" *How-To Geek*, October 9, 2021, available at <https://www.howtogeek.com/752370/what-does-cross-platform-mean-for-gaming-and-other-apps/>.

<sup>479</sup> Google, "Game Change: The Future of Videogames," May 2019, GOOG-PLAY-000231487-551, at 538.

<sup>480</sup> See [REDACTED]

find it easier to challenge Sony and Microsoft (the two largest gaming console providers) via cloud gaming<sup>481</sup>, particularly if cross-platform becomes a reality (although cloud gaming was not expected to become prevalent and reach scale until the late 2020s).<sup>482</sup>

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210. Thus, because (i) app stores on PCs and gaming consoles operate on a different OS platform, with different technical requirements, (ii) consumers use PC and gaming consoles for different purposes (due to differences in functionality), and thus are unlikely to view the two platforms as a substitute to Android; (iii) developers are unlikely to view mobile app stores and PC/gaming console app stores as substitutes because they want to access different sets of consumers and thus distribute apps where they can reach their target audience, I conclude that PC or gaming console app stores are not in the same market as Android App Distribution methods, as my SSNIP test excluding them, in Section V.C.5 below, demonstrates.

h) Substitution between web-based apps and mobile apps is limited

211. I also consider whether consumers and developers would switch to web-based apps in response to a price increase in Android App Distribution and conclude web-based apps are not a reasonable substitute for native mobile apps on Android mobile devices. Web apps require internet connection and do not provide the same features and functionality as mobile apps, thereby providing an inferior user experience.<sup>483</sup> Moreover, as explained below, data indicates that users spend far more time and money on mobile apps than web apps.

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<sup>481</sup> Roach, Jacob and Kevin Parrish, “What is cloud gaming?” *Digital Trends*, March 29, 2021, available at <https://www.digitaltrends.com/gaming/what-is-cloud-gaming-explained/> (“Cloud gaming is a method of playing video games using remote servers in data centers. There’s no need to download and install games on a PC or console. Instead, streaming services require a reliable internet connection to send gaming information to an app or browser installed on the recipient device. The game is rendered and played on the remote server, but you see and interact with everything locally on your device”).

<sup>482</sup> Google, “Game Change: The Future of Videogames,” May 2019, GOOG-PLAY-000231487-551, at 489.

<sup>483</sup> Email from Mike Cleron, Google, to Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems for Google, “Subject: Re: Re: Making the web platform better on Android,” December 10, 2014, GOOG-PLAY-004449004-006 at 004 (“Web apps are, in general, bad for consumers. Our UX posse actually bans Google-authored apps that are APK wrappers for WebViews because they offer an inferior experience and it is almost impossible for them to follow our platform guidelines.”).

212. Google documents suggests that the traditional app experience (not web-based apps) are the “preferred/guaranteed experience” with benefits including supporting offline mode, being based on the home screen or app launch, and providing home screen widgets.<sup>484</sup> This contrasts with “Bookmark [a]pps,” which Google defines as a “shortcut or quick link to the web version of the app opened in a browser.”<sup>485</sup> Google notes that bookmark apps: “[perform] slower than Native apps on the device”; “[do] not have trust and safety of getting app store approval”; and “[r]equire internet [to] use.”<sup>486</sup> Bookmark apps are also unable to “access native function from the operating system (*e.g.*, camera access).”<sup>487</sup> A recent evolution of the bookmark app is what Google calls a “Progressive Web App,” which uses the latest web technologies to “deliver an experience that feels like a native app,” including adding to the home screen, operating offline with little/no internet connectivity, and utilizing some native function (*e.g.*, the camera).<sup>488</sup> However, Google also observes that progressive web apps fall short on some native interactions including: “Smooth animation transitions; Native gestures; Native menus; [and] Material UI Guidelines.”<sup>489</sup>

213. Mobile apps can often be used “offline” (*i.e.*, without an internet connection). For example, content on streaming apps can be downloaded to the smart mobile device for enjoyment even when an internet connection is unavailable, and some Android gaming apps can be played offline.<sup>490</sup> By contrast, web apps require connection to the internet.<sup>491</sup>

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<sup>484</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 256.R.

<sup>485</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 260.R-261.R.

<sup>486</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 264.R.

<sup>487</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 265.R.

<sup>488</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 267.R-272.R.

<sup>489</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 274.R.

<sup>490</sup> Google Play provides a list of offline apps. *See, e.g.*, Google, “Offline Games,” available at [https://web.archive.org/web/20220809221424/https://play.google.com/store/apps/collection/promotion\\_3000933\\_offlinegame?clp=CigKJgogcHJvbW90aW9uXzZmMDA5MzNfb2ZmbGluZWdhbWVtZWtZWEQShgD:S:ANO1ljJOybU&gsr=CioKKAomCiBwcm9tb3Rpb25fMzAwMDkzM19vZmZsaW5lZ2FtZW11YRBKGAM%3D:S:ANO1ljLzKRU&hl=en](https://web.archive.org/web/20220809221424/https://play.google.com/store/apps/collection/promotion_3000933_offlinegame?clp=CigKJgogcHJvbW90aW9uXzZmMDA5MzNfb2ZmbGluZWdhbWVtZWtZWEQShgD:S:ANO1ljJOybU&gsr=CioKKAomCiBwcm9tb3Rpb25fMzAwMDkzM19vZmZsaW5lZ2FtZW11YRBKGAM%3D:S:ANO1ljLzKRU&hl=en). *See also* Griffith, Eric, “How to download video from your favorite streaming service,” *PCMag*, April 2, 2020, available at <https://www.pcmag.com/how-to/how-to-download-video-from-your-favorite-streaming-service> and Hindy, Joe, “15 best offline Android games that require no WiFi,” *Android Authority*, May 4, 2022, available at <https://www.androidauthority.com/best-offline-android-games-669279/>.

<sup>491</sup> *See, e.g.*, GeeksforGeeks, “Difference between Native Apps and Web Apps,” March 31, 2021, available at <https://www.geeksforgeeks.org/difference-between-native-apps-and-web-apps/#:~:text=Native%20apps%20are%20faster%20than,approved%20by%20the%20App%20Store.>

214. Mobile apps sometimes have features that are not available on the website equivalent. For example, Instagram’s features such as dark mode or uploading stories are only available on its mobile app.<sup>492</sup> While consumers can access many online services through web browsers on their smartphones, websites often have longer response times (web-based apps run slower than native apps) and are harder to navigate, resulting in a worse user experience (as noted above, web-based apps also cannot work without an internet connection).<sup>493</sup>

215. Moreover, the significant difference in performance and features between web-based apps and native mobile apps has led many developers to either abandon or deprioritize the web-based version of their apps.<sup>494</sup> For example, in 2012 Facebook decided to move away from an HTML5 version to launching an Android native app because of limitations in “performance and feature set” such as sub-optimal experience of using cameras on the mobile web.<sup>495</sup> As another example, popular apps such as WhatsApp and Pokémon GO are only available on Android smart mobile devices as native apps.<sup>496</sup>

216. Evidence indicates users have navigated to the superior experience of mobile apps. For example, a Comscore report shows consumers spend the overwhelming majority (greater or

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<sup>492</sup> See, e.g., Hindustan Times, “5 features you can use on the Instagram app but not on Instagram website,” January 15, 2020, available at <https://tech.hindustantimes.com/tech/news/5-features-you-can-use-on-the-instagram-app-but-not-on-instagram-website-story-NeLHrjG7H65ABNJ4Ae2u4N.html>.

<sup>493</sup> See, e.g., GeeksforGeeks, “Difference between Native Apps and Web Apps,” March 31, 2021, available at <https://www.geeksforgeeks.org/difference-between-native-apps-and-web-apps/#:~:text=Native%20apps%20are%20faster%20than,approved%20by%20the%20App%20Store> and Rooche, “What are the Benefits of Native App?” June 20, 2022, available at <https://rooche.net/benefits-of-native-app/>.

<sup>494</sup> See, e.g., Montecuolo, Michael, “Native or Web-Based? Selecting the Right Approach for Your Mobile App,” *UX Magazine*, January 29, 2014, available at <https://uxmag.com/articles/native-or-web-based-selecting-the-right-approach-for-your-mobile-app>.

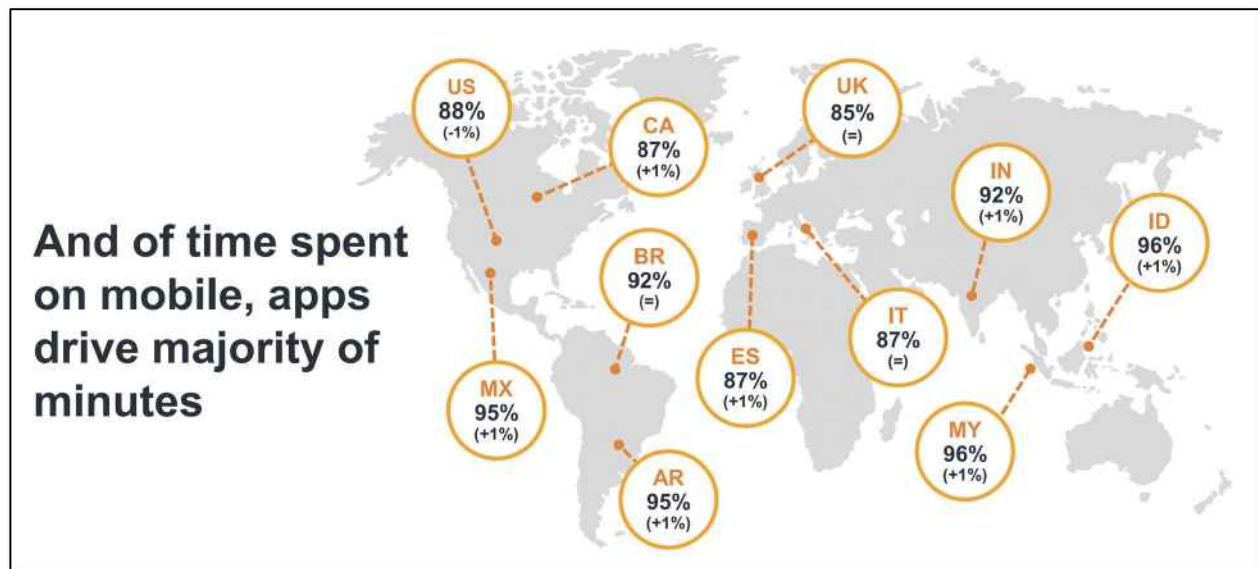
<sup>495</sup> See, e.g., Langel, Tobie, “Introducing the Mobile W3C Community Group,” *Facebook Developers*, February 27, 2012, available at <https://web.archive.org/web/20120511110804/http://developers.facebook.com/html5/blog/post/2012/02/27/introducing-the-mobile-w3c-community-group/>. See also Reisinger, Don, “Facebook close to launch of native Android app – report,” *CNET*, October 8, 2012, available at <https://www.cnet.com/tech/services-and-software/facebook-close-to-launch-of-native-android-app-report/>.

<sup>496</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 256.R. See, e.g., Nguyen, Kim Anh, “Top 7 best native app example in 2022 that merchants can learn from,” *Magenest*, November 30, 2021, available at <https://magenest.com/en/native-app-example/>.



equal to 85 percent in all countries shown) of their mobile time in native apps, as illustrated in Exhibit 26 below.<sup>497</sup>

**Exhibit 26**  
**Proportion of Time Spent on Mobile Apps Globally Excluding China, 2020**



*Source:* Comscore, “Global State of Mobile,” November 2020, available at [https://www.comscore.com/content/download/51336/2998036/file/2020\\_Global\\_State\\_of\\_Mobile.pdf](https://www.comscore.com/content/download/51336/2998036/file/2020_Global_State_of_Mobile.pdf), slide 5.

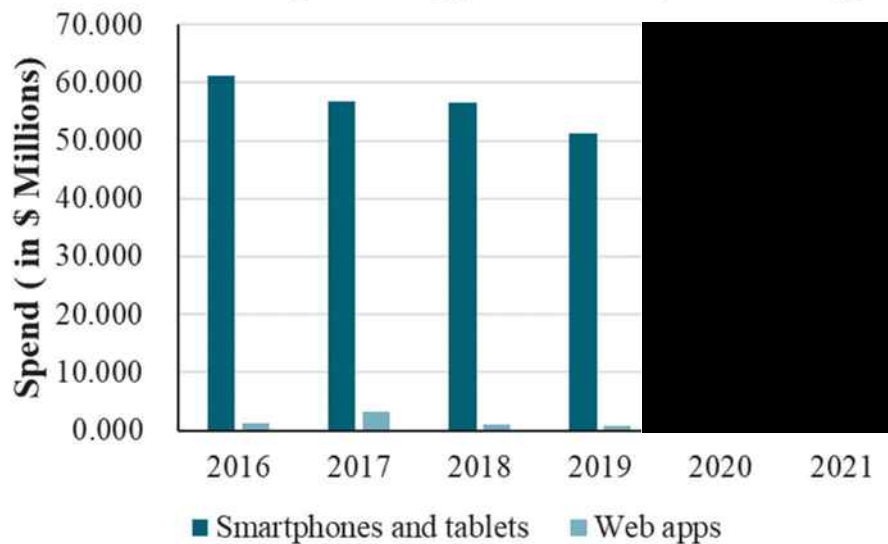
217. Additionally, as shown in Exhibit 27 below, consumers spend overwhelmingly less on web apps than they do on smartphones and tablets combined. For example, according to Google, the total U.S. consumer spending on app downloads was about [REDACTED] on web-app access from January 2016 to December 2021, only [REDACTED] of the amount spent on smartphones and tablets during the same period.<sup>498</sup>

<sup>497</sup> See, e.g., Comscore, “Global State of Mobile,” November 2020, available at [https://www.comscore.com/content/download/51336/2998036/file/2020\\_Global\\_State\\_of\\_Mobile.pdf](https://www.comscore.com/content/download/51336/2998036/file/2020_Global_State_of_Mobile.pdf), at p. 5.

<sup>498</sup> See Rysman Workpapers. Note: The data includes worldwide developers. All transactions relate to U.S. consumer transactions.



**Exhibit 27**  
**The Amount of U.S. Consumer Spend on App Downloads by Platform Type, 2016 – 2021**



*Note:* The data includes worldwide developers. All transactions relate to U.S. consumer transactions.

*Sources:* Monthly App Revenue Data.

218. Therefore, in my view consumers do not find web-based apps as to be sufficiently adequate substitutes for native Android mobile apps such that significant numbers of them would switch in response to a sustained, significant increase in price by a hypothetical monopolist of Android App Distribution. Moreover, developers likely consider web-based apps and native mobile apps as complements,<sup>499</sup> and therefore distributing an app via a browser is not a substitute for distributing native mobile apps on Android.

#### 5. *Implementing the Hypothetical Monopolist Test*

219. To understand whether Google operates the Google Play Store in a two-sided market, I apply the framework set out in Sections V.A and V.B above. The Google Play Store is a platform that matches both developers (who need to distribute apps) and consumers (who need to obtain their apps). The more high-quality apps that are available for download on Google Play Store, the more attractive the Play Store is to consumers. And the more consumers use Google Play

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<sup>499</sup> Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 298.R.

Store, the more developers are incentivized to distribute apps on the Google Play Store, creating a positive feedback loop or externality.<sup>500</sup> Thus, I conclude that, based on the definitions described above, Google operates the Play Store in a two-sided market.

220. As a result of my above observations that Google is operating a two-sided market, the hypothetical monopolist test for Android App Distribution would need to be modified to analyze whether a hypothetical monopolist of Android App Distribution could profitably impose a SSNIP on both consumers and developers together.

221. From a developer perspective, the price paid by developers is the commission Google charges in the but-for world absent the challenged conduct. As presented in Section VII.B.2, my estimate of Google's but-for commission charged to developers for app distribution is approximately 15%. Therefore, a conservative 10% increase in this commission amounts to 16.5 percentage points.

222. From a consumer perspective, while Google does not charge consumers a separate fee for using the Google Play Store, Google has recently introduced Google Play Points, which “rewards users for any purchase they make on Play — including apps, games, in-app items, music, movies, books, and subscriptions - and for downloading select apps and games” and lets participants use points to get discount coupons, in-app items, or Google Play Credit (see Section IV.A.6).<sup>501</sup> The points system is tiered, allowing users who collect enough points in a calendar year to “level up,” earning the user even more points and benefits.<sup>502</sup> In the U.S., users earn “1 point for

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<sup>500</sup> See Email from Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems for Google, to Stephanie Saad Cuthbertson, Google, “Subject: Re: android monetization,” April 17, 2015, GOOG-PLAY-000813755-756, at 755 (“One of the ways in which we make money is via Play -- having a healthy app ecosystem is important, and these developers need to be productive. So it's less about ‘adoption’ per se, and more direc[tly] about having a thriving app ecosystem so that app developers see value, which in tum leads to \$\$\$ for us too.”).

<sup>501</sup> See Schoon, Ben, “Google Play Points rewards program goes official, only works in Japan for now,” *9to5Google*, September 18, 2018, available at <https://9to5google.com/2018/09/18/google-play-points-official-rewards-program-japan/>. However, Google Play Store only expanded to the U.S. in 2019. See also Feng, Paul, “Introducing Google Play Points in the U.S.,” *Android Developers*, November 4, 2019, available at <https://android-developers.googleblog.com/2019/11/introducing-google-play-points-in-us.html> and Join Google Play Points.

<sup>502</sup> See Join Google Play Points.

every \$1 USD [they] spend with Google Play.”<sup>503</sup> Google Play Points functions as a form of negative price that rewards consumers for their purchases via the Google Play Store. Therefore, I model the price paid by consumers as the Google Play Points (or other direct discounts to consumers) that Google would have offered in the but-for world – 0.69%.<sup>504</sup> I note that the proper implementation requires the but-for price of the hypothetical monopolist. However, in my view, Google’s but-for Play Points (and other discounts) is a lower bound on the discount the hypothetical monopolist would provide.

223. In conducting my SSNIP analysis, I start by asking whether the market is broader than App Distribution and In-App Billing Services on Android. This is because I would like to understand whether potential competitive constraints, such as the Apple App Store, act as a sufficient constraint on a hypothetical monopolist that controls both markets (as Google currently does). Therefore, I ask whether a hypothetical monopolist of both markets would find it profitable to impose a 10% SSNIP on both Android App Distribution and Android In-App Billing Services combined. To be clear, this does not mean that Android App Distribution and Android In-App Billing Services on Android are in one broad market. As stated in the *U.S. Merger Guidelines*: “The hypothetical monopolist test ensures that markets are not defined too narrowly, but it does not lead to a single relevant market.”<sup>505</sup> To understand whether a SSNIP of 10% on developers and consumers would have been profitable for a hypothetical monopolist of both markets, I adapt my damages model as described in Appendix F.

224. Intuitively, there are two effects from a hypothetical monopolist imposing a SSNIP of 10%. First, the hypothetical monopolist reduces the discount to consumers (*i.e.*, the number of Play Points). This reduces consumer demand for apps and in-app content, making it less profitable for developers to create new apps and enter the combined market, thereby reducing the variety of apps in the combined market. Second, the hypothetical monopolist increases the commission to developers, decreasing the number of apps (*i.e.*, the variety) and increasing the prices for developers

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<sup>503</sup> See Join Google Play Points.

<sup>504</sup> See Rysman Workpapers.

<sup>505</sup> U.S. Merger Guidelines, § 4.1.1.

that remain set for their apps and in-app content. As a result of the indirect network effects, consumer demand for apps and in-app content falls.

225. The details of my calibration are explained in Section IX.D and also set out in detail in Appendix F. In short, the SSNIP of 10% will be profitable when the following condition is satisfied:

$$C \geq \frac{\epsilon_{Q,p}(1.1\tau^* - 0.9t_B^*)p^{**} - \frac{[(1.1\tau^* - 0.9t_B^*)p^{**} - (\tau^* - t_B^*)p^*]p^*}{p^{**} - p^*}}{\epsilon_{Q,p}} \quad [\text{E. 15}]$$

226. Where  $C$  is the hypothetical monopolist's marginal cost per transaction (same for both initial app download and in-app transaction),  $\tau^*$  is the competitive commission for Android App Distribution and Android In-App Billing Services on which the hypothetical monopolist imposes the SSNIP (15%),  $t_B^*$  is the but-for Google's discount rate including Play Points offered to consumers [REDACTED] is the but-for price of app/in-app content,  $p^{**}$  is but-for price after SSNIP is imposed, and  $\epsilon_{Q,p}$  is the percentage change in the equilibrium number of transactions divided by the percentage change in equilibrium prices as a result of the SSNIP (1.16).<sup>506</sup>

227. The prices,  $p^*$  and  $p^{**}$ , and the parameter  $\epsilon_{Q,p}$ , are solved for and calibrated using my damages model adapted for SSNIP analysis. The prices are determined in equilibrium as a result of competition between a large number of apps. The parameter  $\epsilon_{Q,p}$  accounts for the supply and demand forces discussed above.

228. The right-hand side of E.15 provides a critical threshold for the marginal cost for hypothetical monopolist such that SSNIP is profitable if marginal cost is larger than the critical threshold. The critical threshold is calibrated as the following:

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<sup>506</sup> The calibration is detailed in the Appendix F. See Rysman Workpapers.

**Exhibit 28**

[REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED] Monthly App Revenue Data.

229. Plugging in the calibrated parameters, the Equation E.15 yields:

$$C \geq \frac{1.16 \times (1.1 \times 15\% - 0.9 \times 0.69\%) \times \$7.76 - \frac{[(1.1 \times 15\% - 0.9 \times 0.69\%) \times \$7.76 - (15\% - 0.69\%) \times \$7.62] \times \$7.62}{\$7.76 - \$7.62}}{1.16} \approx -\$5.54$$

230. The result means that the 10% SSNIP is profitable when the hypothetical monopolist's marginal cost is greater than or equal to -\$5.54. Thus, any positive marginal cost would satisfy the SSNIP test. According to Google's internal documents, Google incurs costs to provide the Google Play Store (including both app distribution and in-app billing services). These include:

- Transaction or payment processing costs. For example, Google Play's effective rate (total fees/total sales) for payments was [REDACTED] worldwide and [REDACTED] in the U.S. in 2014, which includes the cost of payment and chargeback losses.<sup>507</sup> Additional documents note

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<sup>507</sup> Google, "Play Cost of Payments," September 9, 2014, GOOG-PLAY-003764714.R-746.R, at 715.R-720.R.

payment processing costs in the U.S. were about █████ in 2021<sup>508</sup>, and in 2017 “Transaction Fees (CC/PP, DCB, GC)” were █████ of customer spend.<sup>509</sup>

- Customer support costs at █████ of consumer spend for apps and games.<sup>510</sup>
- Centralized infrastructure costs, which Google notes are c. █████ of revenue.<sup>511</sup>

231. Therefore, given these costs are positive, I conclude that Google must face at least some positive marginal costs to provide the Google Play Store. Subsequently, marginal cost is almost certainly greater than the 10% SSNIP marginal cost threshold of -\$5.54 as noted above. Therefore, in my view, the 10% combined SSNIP on the Android App Distribution and Android In-App Billing Services Markets is profitable and thus the combined market does not include any constraints from outside the Android App Distribution or In-App Billing Services markets (such as the Apple App Store and associated billing services).

## 6. *Geographic Market*

232. I conclude that the relevant geographic dimension to this market is worldwide (excluding China).<sup>512</sup> As noted in Section IV.B.2, OEMs of Android smart mobile devices sign a MADA that allows them to sell their Android smart mobile devices with the Google Play Store pre-installed in most parts of the world.<sup>513</sup> Given availability and popularity in most parts of the world, Android developers who want to distribute their Android apps can reach a global audience no matter which country the developers are based in. Further, as explained by Huawei: “Generally

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<sup>508</sup> Google, “Project Everest – Potential Evolutions,” July 2, 2021, GOOG-PLAY-007819776-064, at 876.

<sup>509</sup> Google may incur additional transaction costs when customers use gift cards (which range from █████% to █████% of customer spend) or direct carrier billing (which are “████% of consumer spend for Apps & █████% for digital content.”). See Google, “Play Finance Overview,” November 2017, GOOG-PLAY-000613152.R-249.R, at 162.R and 180.R.

<sup>510</sup> Google, “Play Finance Overview,” November 2017, GOOG-PLAY-000613152-249.R at 162.R.

<sup>511</sup> Google, “Play Finance Overview,” November 2017, GOOG-PLAY-000613152-249.R at 162.R.

<sup>512</sup> See Google, “Partnerships,” GOOG-PLAY4-002169674-679, at 675 (“Lenovo: Officially started shipping Google in all consumer markets except China”) and Google, “Defining Innovation Strategy Checkpoint 2,” April 4, 2013, GOOG-PLAY-004253884-960, at 894 (“Samsung Leads in All Retail Driven Markets except China”).

<sup>513</sup> Kolotouros (Google) Deposition, p. 450 (“Q. I’m going to ask you some basic questions to start. Are most contracts between Google and OEMs worldwide excluding China? A. Generally, yes”) and EC Google Android Decision, ¶ 415 and FN 409.

speaking, competition takes place at a worldwide level because this is at that level that most of the apps in the appstore compete. For instance, customers in the UK and USA will download the same version of gaming applications, such as Angry Birds. Some of applications like news-related ones may compete at a regional level, but their number is limited.”<sup>514</sup> In internal documents, Google itself admits that “Play Store dominates in all countries[.]”<sup>515</sup> As noted in a Google internal document, as of February 2021, the Google Play Store has been installed on nearly 2.96 billion smartphones and tablets worldwide excluding China.<sup>516</sup> Some of Google’s larger app distribution competitors (*e.g.*, Samsung and F-Droid) are also based outside the United States.<sup>517</sup>

233. The relevant geographic market excludes China, where the Google Play Store is unavailable (as are most other Google apps, such as Google Search, Google Maps, and YouTube).<sup>518</sup> Instead, the most popular Android app stores in China were developed by Chinese companies (*e.g.*, the Tencent My App, 360 Mobile Assistant, and Baidu Mobile Assistant).<sup>519</sup> These app stores have no significant presence outside of China, because Chinese OEMs pre-install the Google Play Store on all devices that are sold outside of China (*e.g.*, Huawei, Lenovo, or Xiaomi).<sup>520</sup>

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234. Based on the evidence presented above, I find the Android App Distribution Market worldwide excluding China is a relevant antitrust market. I find that the Android App Distribution

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<sup>514</sup> EC Google Android Decision, ¶¶ 412-415.

<sup>515</sup> Google, “Google Play Competitive Usage Survey,” GOOG-PLAY-001886111.R-166.R, at 118.R.

<sup>516</sup> Google, “App Stores on Android 12,” February 2021, GOOG-PLAY-006814475.R-497.R, at 477.R.

<sup>517</sup> Aptoide, “The game-changing alternative Android app store,” available at <https://en.aptoide.com/company/about-us> and Bondarenko, Peter, “Samsung,” *Britannica*, October 1, 2021, available at <https://www.britannica.com/topic/Samsung-Electronics>.

<sup>518</sup> D’Onfro, Jillian, “Google is missing out on billions of dollars by not having an app store in China, new data shows,” *CNBC*, January 17, 2018, available at <https://www.cnbc.com/2018/01/17/google-misses-out-on-billions-in-china.html> and Comparitech, “Is Google blocked in China?” available at <https://www.comparitech.com/privacy-security-tools/blockedinchina/google/>.

<sup>519</sup> Kuhns, Todd, “The Top 15 App Stores In China,” *AppInChina*, June 24, 2022, available at <https://www.appinchina.co/blog/the-top-15-app-stores-in-china/>.

<sup>520</sup> EC Google Android Decision, ¶¶ 10 and 417-419.



Market includes Android app stores and sideloading while the substitution and constraint from more remote alternatives, such as the Apple App Store, PC app stores, and gaming console app stores, are not sufficient to include them in the relevant market.

#### **D. Android In-App Billing Services Market is a Relevant Market**

235. The second relevant antitrust market related to Google's alleged conduct is the Android In-App Billing Services Market. As discussed in Section III.D, developers who monetize in-app content require a billing service provider to receive payment and authorize the unlocking of the purchased in-app content.<sup>521</sup> The Android In-App Billing Service provider is a vendor to the developer, who requires In-App Billing Services to complete Android smart mobile device users' purchases of in-app content (as well as being part of the experience that the app provides).

236. My analysis of the Android In-App Billing Services Market proceeds as follows in seven parts. *First*, I summarize the basic functionality of products in the Android In-App Billing Services Market, including Google Play Billing. *Second*, I explain how in-app billing services are separate from Android App Distribution, and how Google Play Billing is a separate and distinct product from the Google Play Store. *Third*, I determine that the Android In-App Billing Services Market is a one-sided market between developers (as buyers) and Android In-App Billing Services providers (as sellers). *Fourth*, with those considerations in mind, I apply the HMT to define the boundaries of the Android In-App Billing Services Market. *Fifth*, I consider potential alternative market definitions for the Android In-App Billing Services Market. *Finally*, I define the geographic market as worldwide excluding China.

237. I conclude that the Android In-App Billing Services Market consists of: (i) Google Play Billing; (ii) developers' own billing service systems; and (iii) independent billing service providers.

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<sup>521</sup> Dubrova, Daria, "How to integrate payment systems into the existing app," *The App Solutions*, available at <https://theappsolutions.com/blog/development/payment-systems-for-the-app/>.

1. *The Function of Android In-App Billing Services and Google Play Billing*

238. As described in Section III.D, Android in-app billing services consist of a bundle of complementary services, which includes receiving payment and authorizing the unlocking of the purchased in-app content<sup>522</sup> and may also include invoicing, payment history, and refund processing.<sup>523</sup> However, my review of the evidence in this case shows that, at its core, these services all include a software development kit (“SDK”) or application programming interfaces (“APIs”) that the developer programs its app to interact with to enable the unlocking of the in-app content or digital content subscriptions.<sup>524</sup> Seamless in-app billing services, which enable consumers to complete payments securely and swiftly without leaving the app, are important to the user experience and lead to higher conversion of completed purchases within an app.<sup>525</sup> As part of this seamless experience, a payment gateway works as a virtual terminal at checkout to encrypt customers’ credit card information/payment credentials and pass them to payment processors, which then pass a consumer’s payment data to an issuing bank, collect funds from the card-issuing

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<sup>522</sup> Xsolla, for example, is an online payment gateway that connects to credit cards networks (e.g., Visa), integrated billing service providers (e.g., PayPal), and payment systems (e.g., Apple Pay and Google Pay). See Xsolla, “Pay Station,” available at <https://xsolla.com/products/paystation> and Xsolla, “Grant Purchases to User,” available at <https://developers.xsolla.com/solutions/web-shop/catalog-and-items/grant-purchases/>. As another example, Zuora is a payment processor specializing in subscription billing services. See Zuora, “Billing Software,” available at <https://www.zuora.com/products/billing-software/>.

<sup>523</sup> For example, Amazon’s In-App Purchasing API performs the following workflow: “logic to display the purchasable item,” “perform the purchase,” “handle any preconditions or error scenarios.” It does not offer refunds on purchases of in-app items or track consumers’ purchases. See Amazon Appstore, “In-App Purchasing Overview,” May 18, 2022, available at <https://developer.amazon.com/docs/in-app-purchasing/iap-overview.html>.

<sup>524</sup> Samat (Google) Deposition, pp. 470-471 (“Q. And those developers were required to use Google’s proprietary billing system with certain exceptions; correct? A. Well, there is an integrated set of payment APIs that are part of the Google Play platform. [ . . . ] Q. So the answer to my question was yes, they were required to use Google’s proprietary billing system; correct? A. Well, as I said, they were required to integrate with a set of payment APIs and flows that were part of the Google Play platform”). See also Samsung, “What is Samsung In-App Purchase?” available at <https://developer.samsung.com/iap/overview.html>.

<sup>525</sup> Chu (Meta Platforms (formerly Google)) Deposition, p. 259 (“Q. From an engineering perspective why did you want to remove friction on the YouTube commerce platform? A. The work that we did was in the form of, for example, reduce the number of clicks. From the moment the user wants to buy something what can we do to reduce number of clicks and make it easier for them to purchase something. Reason for that is obvious that the more friction there is the more likely we lose users along the buy flow.”).

bank, and transfer the funds to the merchant's account after deducting a fee.<sup>526</sup> Exhibit 30 illustrates the process of enabling the purchase of in-app digital content.

239. Different app stores and different independent payment service providers offer (or are poised to offer) the full suite of in-app billing services or different elements of the billing services bundle within this market. I describe the options available to Android app developers below.

a) Android In-App Billing Services Offered by Android App Stores

240. Some Android app stores offer Android In-App Billing Services that include the SDK or API specific to that billing system. The Amazon Appstore describes the In-App Billing Services it provides with its "In-App Purchasing API" vs. what developers must provide for themselves as shown in Exhibit 29 below.

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<sup>526</sup> See, e.g., Dublino, Jennier, "Payment Gateway vs. Payment Processor," *business.com*, September 20, 2022, available at <https://www.business.com/articles/payment-gateway-vs-payment-processor/>.

**Exhibit 29**  
**Amazon Appstore In-App Purchasing API Responsibility**

The following table summarizes the separation of responsibility between your app and the Amazon Appstore when implementing IAP:

Responsibility	Your App	Amazon
Presents the catalog of in-app items to the customer for purchase.	✓	
Unlocks purchasable functionality.	✓	
Manages the purchase flow.		✓
Performs payment processing.		✓
Handles secure communication with the Amazon platform, including payment security.		✓
Verifies entitlements and validates purchase receipts.	✓	✓
Manages billing for auto-renewing subscriptions.		✓
Manages billing for revoking of entitlements.		✓
Verifies receipts for subscriptions and entitlements before providing content to user.	✓	
Downloads remotely delivered content.	✓	
Displays and uses downloaded digital goods.	✓	
Tracks customer purchases and consumable inventory.	✓	
<b>Note: Amazon offers no refunds on purchases of in-app items.</b>		

*Source:* Amazon, “In-App Purchasing Overview,” available at <https://developer.amazon.com/docs/in-app-purchasing/iap-overview.html>.

241. Amazon explains that its in-app billing API provides “purchase dialogs, transaction timeout logic, [and] ‘Thank You’ dialogs” during the digital in-app content purchase flow.<sup>527</sup> For

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<sup>527</sup> Amazon, “In-App Purchasing Overview,” available at <https://developer.amazon.com/docs/in-app-purchasing/iap-overview.html>.

situations where the in-app content is downloaded to the user device as part of the original app download, the Amazon Appstore in-app billing API works in the steps shown in Exhibit 30 below.

**Exhibit 30**  
**Amazon Appstore In-App Purchasing API Steps**

Step	Component	Task
Step 1	App	App launches the in-app purchase flow. App invokes IAP API to manage the purchase.
Step 2	IAP API	IAP API interacts with the user to complete the purchase. IAP API returns a purchase receipt to the App.
Step 3	App	App uses the receipt to unlock the purchased local content.

*Source:* Amazon, “In-App Purchasing Overview,” available at <https://developer.amazon.com/docs/in-app-purchasing/iap-overview.html>.

242. Similarly, Samsung offers “Samsung In-App Purchase” for apps published on the Samsung Galaxy Store.<sup>528</sup> Samsung In-App Purchase includes “an SDK and Server APIs,” which “enable [developers] to easily integrate IAP functionality into [an] app, such as configuring IAP, getting item details, offering and selling items, and managing purchased items,” as well as “verify[ing] item purchases, creat[ing] a service token, and check[ing] subscription status.”<sup>529</sup> Samsung explains that the first step for developers using Samsung In-App Purchase is to “[d]ownload the Samsung In-App Purchase SDK and integrate it into your application.”<sup>530</sup> The functionality of the Samsung IAP SDK is shown in Exhibit 31 below:

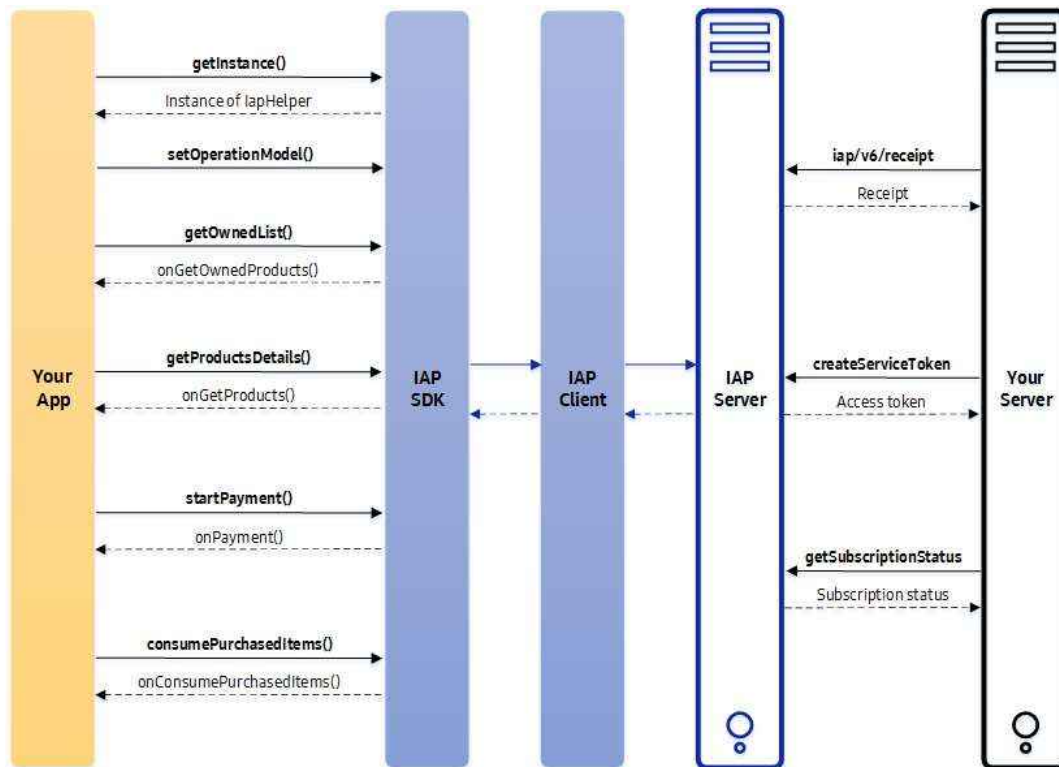
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<sup>528</sup> Samsung, “What is Samsung In-App Purchase?” available at <https://developer.samsung.com/iap/overview.html>.

<sup>529</sup> Samsung, “What is Samsung In-App Purchase?” available at <https://developer.samsung.com/iap/overview.html>.

<sup>530</sup> Samsung, “What is Samsung In-App Purchase?” available at <https://developer.samsung.com/iap/overview.html>.

**Exhibit 31**  
**Samsung Galaxy Store In-App Purchasing SDK**

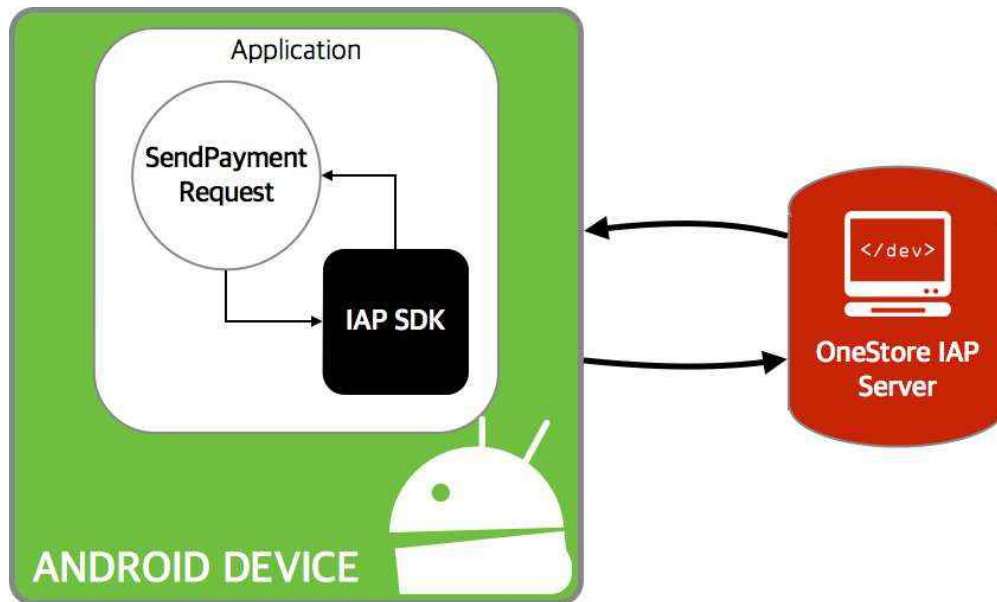


Source: Samsung, “What is Samsung In-App Purchase?,” available at <https://developer.samsung.com/iap/overview.html>.

243. The ONE store also offers an in-app billing services API. ONE store explains that the in-app billing services functionality does not come as part of the store itself; rather, an “IAP module” must be “applied to [the] developer’s app,” and that module “is provided as [a] Java development library, which is called IAP SDK (In-App Purchase Software Development Kit).”<sup>531</sup> ONE store illustrates this as shown in Exhibit 32 below:

<sup>531</sup> GitHub, “What is ONE store In-App Purchase?” available at <https://github.com/ONE-store/inapp-sdk-eng>.

**Exhibit 32**  
**ONE Store In-App Purchasing SDK**



*Source:* GitHub, “What is ONE store In-App Purchase?” available at <https://github.com/ONE-store/inapp-sdk-eng>.

244. As explained in Section III.D, Google Play Billing is Google’s billing service, which provides a bundle of at least four services that allows developers to sell digital content through their Android apps: (1) a set of APIs that developers must build their apps around that enable the unlocking of in-app content; (2) a token and order ID the developer uses to verify that the user successfully purchased and unlocked the in-app content; (3) actual payment processing of the transaction with banks; and (4) refund services for some credit card transactions made and then cancelled within 48 hours from purchase.<sup>532</sup> With respect to subscriptions for in-app content, Google also gives developers a tool for subscription management.<sup>533</sup> I understand that Google Play Billing does not include general customer service, refund services after 48 hours from purchase, any

<sup>532</sup> Loew (Google) Deposition, p. 48, 55-60, 93-99, and 193; Google Play Help, “Learn about refunds on Google Play,” available at <https://support.google.com/googleplay/answer/2479637?hl=en-GB#:~:text=Your%20Play%20Pass%20subscription%20can,month%20in%20which%20you%20cancelled> (“It’s less been than 48 hours since you bought an app or made an in-app purchase: you can request a refund through Google Play.”).

<sup>533</sup> Google, “Create and manage subscriptions,” available at <https://support.google.com/googleplay/android-developer/answer/140504?hl=en>.



content delivery, or any digital wallet services such as Google Pay (see Section III.D). As Mr. Koh testified, Google does not *deliver* the in-app content (*e.g.*, in-game coins or Tinder subscription); the in-app content is hosted on the developer's own server and is *delivered* by the developer.<sup>534</sup>

b) Alternative Android In-App Billing Services Available to Developers

245. Absent Google's requirement that developers use Google Play Billing, app developers would also be able to develop their own Android in-app billing services, use third-party in-app billing service providers for the entire bundle of in-app billing services, or combine some elements from each.<sup>535</sup> Because certain purchases of digital goods (as well as purchases of physical goods sold via Android apps distributed through Google Play Store, which are not subject to Google's contractual restrictions,<sup>536</sup> and in-app purchases in certain countries where Google Play

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<sup>534</sup> Koh (EA (formerly Google)) Deposition, pp. 382-383 ("Q. Does the inventory reside on the developer's server typically? A. Typically, yes, it does"; "Q. It's the developer that delivers the in-app content to the users, not Google; right? A. Yes, that is correct").

<sup>535</sup> Google, "Understanding Google Play's payments policy – Frequently asked questions," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en-GB#zippy=%2Ccan-i-offer-a-consumption-only-reader-app-on-google-play> ("Purchases of digital goods or services that can only be consumed outside of a Play-distributed app and cannot be accessed in a Play-distributed app do not require Google Play's billing system").

<sup>536</sup> Google, "Google Play Payments Policy," available at <https://support.google.com/googleplay/android-developer/answer/9858738>; Google, "Understanding Google Play's payments policy – Frequently asked questions," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en-GB#zippy=%2Ccan-i-offer-a-consumption-only-reader-app-on-google-play> ("Google Play allows any app to be consumption-only, even if it is part of a paid service. For example, a user could log in when the app opens and access content paid for somewhere else"); Google, "Play Billing Policy," August 2019, GOOG-PLAY-003334312-347, at 314; and Google, "Understanding Google Play's Payments policy," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en#:~:text=Starting%20on%20June%201%2C%202022,payments%20landscape%20in%20the%20country> ("In 2020, we clarified the language in our Payments policy to be more explicit that all developers selling digital goods and services in their apps are required to use Google Play's billing system. Apps using an alternative in-app billing system will need to remove it in order to comply with the Payments policy ... Starting June 1, 2022, any app that is still not compliant will be removed from Google Play").

Billing is not available<sup>537</sup>) do not use Google Play Billing, I understand it is technically feasible for developers to use these alternatives to Google Play Billing.<sup>538</sup>

246. Some prominent developers handle in-app billing services in-house. For example, Spotify,<sup>539</sup> Netflix,<sup>540</sup> and Tinder<sup>541</sup> are examples of apps that historically have not used Google Play Billing for Android In-App Billing Services.<sup>542</sup> Additionally, Epic Games announced its own in-app billing system in 2020.<sup>543</sup>

247. Some developers subcontract aspects of Android In-App Billing Services—including the SDK or APIs—to standalone payments entities that do not have app stores. Square, for example, offers a variety of payments products, including point-of-sale systems for retailers and restaurants.<sup>544</sup> In 2019, Square launched an “In-App Payments SDK” for multiple mobile OSs,

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<sup>537</sup> See, e.g., Loew (Google) Deposition, p. 199 (“Q And is Google Play Billing available in every country where Google Play is available? A Google Play Billing is not available in every country that Google Play is available. Q Google Play Billing is not available in about 50 countries where Google Play is available. Does that sound right? A I don't know the list off the top of my head, so I can't say yes or no. Q But there are some number of countries where Google Play is available and Google Play Billing is not available; correct? A That is correct.”).

<sup>538</sup> See Lockheimer Deposition, p.83 (“Q. Okay. Is it, as we sit here now, technically possible -- aside from whatever policies Google has in place, is it technically possible for a developer to offer an in-app purchase using a payment solution other than Google Play Billing? A. Technically, yes, the technology certainly exists to accomplish that. Yes.”).

<sup>539</sup> Rasanen (formerly Google) Deposition, p. 307 (“Q. And that Spotify was surprised and concerned when it became aware it might be required to adopt Google Play billing; is that right? A. That’s what I wrote in that email, yes”).

<sup>540</sup> Rosenberg (Google) Deposition, p. 269 (“Q. So let’s take these one by one. Was Netflix on Android at the time of this email? A. I believe so. Q. And was it using Google Play billing? A. I don’t – I don’t think so”).

<sup>541</sup> Lim (Google) Deposition, pp. 505-506 (explaining that Netflix, Hulu, and Tinder did not use Google Play Billing for in-app purchases of digital content).

<sup>542</sup> Google, “Google / Match Group Exec Summit August 2019,” August 2019, GOOG-PLAY-002438751-754, at 753 (“In April, Tinder removed Google Play In-App Billing as the default billing solution in favor of their native solution”); Google, “Spotify – Next Steps,” December 2020, GOOG-PLAY-006997722-751, at 723 (“[REDACTED]”); and Google, “Billing Policy Compliance,” January 2021, GOOG-PLAY-006817773.R-890.R, at 853.R (“[Netflix:] Aligned on a consumption-only model”).

<sup>543</sup> The Fortnite Team, “Announcing Epic Direct Payment on Mobile,” *Epic Games*, August 13, 2020, available at <https://www.epicgames.com/fortnite/en-US/news/announcing-epic-direct-payment-on-mobile>.

<sup>544</sup> Square, “A point of sale for however you sell,” available at <https://squareup.com/us/en/point-of-sale>.

including Android.<sup>545</sup> The app developer using Square’s solution must integrate the In-App Payment SDK with their app, which then “captures payment information and returns a valid payment token.”<sup>546</sup> The app then interfaces with the “Square Payments API, which accepts the payment token and sends the create payment requests to Square.”<sup>547</sup> Square warns its developer customers that “using the In-App Payments SDK to process digital sales might not be allowed by some mobile application distribution services (such as App Store and Google Play) and might result in your application being removed” from those app stores by running afoul of their requirements to use only the app store billing system for in-app payments.<sup>548</sup>

248. In summary, Google’s policy of mandating that developers distributing apps via the Google Play Store use Google Play Billing has meant that 97% of developers that have sold digital content on the Google Play Store use Google Play Billing.<sup>549</sup> However, there are many in-house (*i.e.*, developing their own API) or third-party solutions that are more cost effective or entail billing features that are specific to the app.<sup>550</sup> For example, the Match Group “has found that its payment systems are better for customers and Match,” because Match “can provide better experiences for

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<sup>545</sup> Square, “Square Launches Payments SDK, Enabling Developers To Process Payments With Square In Their Mobile Apps,” January 9, 2019, available at <https://squareup.com/us/en/press/payments-sdk> (“With the introduction of in-app mobile payments to the Square platform, developers now have a complete, omnichannel payments solution for all their payment needs,” said Carl Perry, Developer Lead at Square. ‘From software to hardware to services, Square offers a complete payments experience all in one cohesive open platform[.]’”).

<sup>546</sup> Square, “In-App Payments SDK Overview,” available at <https://developer.squareup.com/docs/in-app-payments-sdk/what-it-does>.

<sup>547</sup> Square, “In-App Payments SDK Overview,” available at <https://developer.squareup.com/docs/in-app-payments-sdk/what-it-does>.

<sup>548</sup> Square, Build on Android, <https://developer.squareup.com/docs/in-app-payments-sdk/build-on-android>, available at See also Samsung, “What is Samsung In-App Purchase?” available at <https://developer.samsung.com/iap/overview.html>.

<sup>549</sup> Samat, Sameer, “Listening to Developer Feedback to Improve Google Play,” *Android Developers*, September 28, 2020, available at <https://android-developers.googleblog.com/2020/09/listening-to-developer-feedback-to.html>.

<sup>550</sup> See “Stipulation and [Proposed] Order on Match’s Motion for Temporary Restraining Order,” *Match Group, LLC, et al. v. Google LLC, et al.*, the United States District Court for the Northern District of California San Francisco Division, Case No. 3:22-cv-02746-JD, May 19, 2022 (hereafter “Match Stipulation”), at ¶ 3 (“Match agrees to work in good faith on further enabling Google’s Play’s billing system as an option for users of its apps so long as Google agrees to work in good faith to continue to develop additional billing system features that are important to Match.”) and “Joint Stipulation and [Proposed] Order Regarding Epic Games, INC.’s Request for Preliminary Relief,” *Epic Games, Inc. v. Google LLC et al.*, the United States District Court for the Northern District of California San Francisco Division, Case No. 3:20-cv-05671-JD, May 20, 2022 (hereafter “Bandcamp Stipulation”), ¶¶ 2-4.

users, better customer service, more flexibility in payment options, and enhance user safety.”<sup>551</sup> Specifically, “unlike GPB, Match Group’s alternative payment options offer users an easy checkout process involving input of their payment info plus just a single, added click to complete their checkout”; because “Match Group’s payment systems also support features that enhance the user experience and facilitate payments, which GPB does not support,” including “allow[ing] app developers to choose which payment methods should be offered to users (e.g., credit card, PayPal), which can be crucial for an app’s success as consumer preferences are different from one country to another”; and because ,” Match Group’s payment solutions can provide more “flexibility in the design of subscription plans,” can “enable[ ] the user to make monthly payments for subscriptions, instead of paying a lump sum” unlike Google Play Billing, and can provide for “rule-based regional pricing.”<sup>552</sup>

249. Absent Google’s conduct, developers would therefore be incentivized to substitute to these alternatives to Google Play Billing – because they would capture the revenue that flows to Google by virtue of its requirement that developers use Google Play Billing. The evidence therefore suggests that Google Play Billing, developers’ own transactions service systems, and third-party billing services should all be included in the Android In-App Billing Services Market.

2. *Google Play Billing and Android In-App Billing Services Are Products Separate and Distinct from Android App Distribution*

250. Counsel has instructed me to consider the question of whether demand for Android In-App Billing Services exists separately from the demand for Android App Distribution. The economic evidence shows that it does. Developers can and do select Android In-App Billing Services from independent in-app billing service providers or develop their own in-app billing service solutions. Further, some Android app stores do not mandate their own in-app billing services but instead offer multiple options to developers.

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<sup>551</sup> Declaration of Peter Foster in Support of Plaintiffs Match Group, LLC’s, Humor Rainbow, Inc.’s, Plentyoffish Media ULC’s, And People Media, Inc.’s Motion for Temporary Restraining Order, May 10, 2022 (hereafter “Foster Declaration”), ¶ 75.

<sup>552</sup> Foster Declaration, ¶¶ 76-83.

251. Additionally, Android App Distribution and In-App Billing Services are not substitutes. Consumers, whose in-app purchases drive developers' demand for In-App Billing Services, cannot obtain in-app content without first downloading the app. Thus, from a consumer perspective, in-app purchases and app distribution are complements. From a developer perspective, while it is possible to change the way they generate revenue from their apps (*e.g.*, an upfront/fixed cost for an app vs. a free app with in-app transactions), developers cannot abandon app distribution entirely. Naturally, the developer requires the app to be downloaded before the developer can sell any in-app content for which it requires In-App Billing Services.

a) When Given a Choice, Developers Select Android In-App Billing Services from Independent Service Providers or Develop Their Own Solutions

252. As described in Section IV.B.2, Google requires almost all Android developers to use Google Play Billing for digital in-app transactions associated with apps downloaded from the Google Play Store. However, as described in Section V.D.1 above, technologically this need not be the case.<sup>553</sup> As further described in Section V.D.1 above, absent Google's requirement that developers use Google Play Billing, app developers would be able to choose their own billing service providers, either by providing some of those services themselves or by using independent billing service providers.<sup>554</sup>

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<sup>553</sup> In its discussions with [REDACTED] Google has considered allowing [REDACTED] without Google Play Billing. *See* Google, "Billing Integration for Android Market," GOOG-PLAY-005653612.R-617.R, at 617.R.

<sup>554</sup> *See, e.g.*, Google, "Understanding Google Play's payments policy – Frequently asked questions," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en-GB#zippy=%2Cdoes-your-billing-policy-change-depending-on-my-app-category%2Cdoes-the-requirement-to-use-google-plays-billing-system-apply-to-purchases-of-goods-or-services-that-cant-be-used-within-the-app> ("Purchases of digital goods or services that can only be consumed outside of a Play-distributed app and cannot be accessed in a Play-distributed app do not require Google Play's billing system.").

253. Many developers indeed aspired to own the end-to-end in-app billing process.<sup>555</sup> Despite Google's attempts to mandate the use of Google Play Billing for purchases of digital goods through an app downloaded from the Google Play Store, Google's agreement with developers meant it could not remove, de-list or refuse to list an app, even if that developer's app offered in-app purchases through means others than Google Play Billing, or that developers did not pay fees to Google on in-app purchases made through other means than Google Play Billing.<sup>556</sup> Google allowed an exemption from its policies for "digital content or goods that may be consumed outside of the application itself (*e.g.*, buying songs that can be played on other music players)."<sup>557</sup> Many large developers who offered their content outside the app, such as Spotify, Netflix, and Tinder, argued they were exempt from Google's policy, based on this exemption.<sup>558</sup> As of June 2020, several prominent developers, including Match, LinkedIn, Skype, ABCMouse, Meetic, Kakao Page, and AfreecaTv, to name a few, did not have Google Play Billing integration.<sup>559</sup> Recognizing that developers understood its policy permitted them to use their own billing systems in certain instances, Google clarified the policy on September 28, 2020, "to be more explicit that all developers selling digital goods and services in their apps are required to use Google Play's billing system. Apps using an alternative in-app billing system will need to remove it in order to comply

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<sup>555</sup> Koh (EA (formerly Google)) Deposition, p 183 ("There were developers that aspired to be -- have owned the end-to-end cycle. And yes, working with Google Play wouldn't allow developers to -- developers aspired to own that, to own that, complete end-to-end cycle."); and Email from Paul Feng, Product Management Director for Google, to Kristin Reinke, Google, "Subject: Re: Netflix," February 1, 2019, GOOG-PLAY-000259276-279, at 276 ("Netflix is definitely not the only developer who would like to use their own payments system. There are only a handful who can build out a global system like ours, but that's not the only reason you'd want to use your own"); Rasanen (Google) Deposition, p. 129 ("Q. In your business development role at Play, were you involved in conversations with particular developers about integrating Google Play Billing into their apps? A. I was, yes. Q. Which developers did you talk to? A. I talked to Spotify, I may have been involved in Netflix conversations; it may not have been me. The Match apps, various apps on Match, which were not using Play Billing. [Badoo], I think, was another one. Or maybe that's a Match app -- I don't know who owns who anymore. There were others but they are not coming to me right now. Hulu -- oh, Hulu was another one we spoke with.").

<sup>556</sup> See, *e.g.*, Match Stipulation, ¶ 1.

<sup>557</sup> See, "Google Play Developer Program Policies," Google Play via Wayback Machine captured on August 1, 2012, available at <https://web.archive.org/web/20120801104115/https://play.google.com/about/developer-content-policy.html>.

<sup>558</sup> See, *e.g.*, Rosenberg Deposition, pp. 262-264 (explaining that Google had to offer the LRAP type deals to entice these developers to adopt GPB, because they were not required to under the language of the policy).

<sup>559</sup> Google, "Play Payments Policy," June 17, 2020, GOOG-PLAY-001018461.R-468.R, at 464.R.

with the Payments policy.”<sup>560</sup> Subsequently, in 2021, Google closed down this exemption, issuing updates to its policy,<sup>561</sup> which Google claimed was merely a clarification of its policy that all these developers had to use GPB.<sup>562</sup>

254. Certain developers view their “billing platform[s] [a]s a competitive advantage.”<sup>563</sup> Even the Google-owned YouTube is not integrated with Google’s billing option due to “[c]ons” such as “[s]ubstantial upfront work for YouTube” and “[l]os[s] of YouTube innovation independence,” which reinforces the plausibility of de-integrating Google Play Billing for developers that offer in-app purchases.<sup>564</sup>

255. Google executives have recognized that developers may want to offer their own billing solutions, which could lead to a cascading effect. For example, in a 2019 email to Paul Feng,

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<sup>560</sup> Google, “Understanding Google Play’s Payments policy,” available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en> and Ahmed, Arooj, “Google Has Finally Announced the Change in the Billing Policies of Play Store Apps,” *Digital Information World*, September 30, 2020, available at <https://www.digitalinformationworld.com/2020/09/google-has-finally-announced-the-change-in-the-billing-policies-of-play-store-apps.html#:~:text=On%2028%20September%2C%20Google%20officially,rarely%20use%20Google%27s%20billing%20system.>

<sup>561</sup> See Google, “Play Billing Policy,” August 2019, GOOG-PLAY-003334312-347, at 314; Google, GOOG-PLAY-004702879-881, at 879; and Google, “Updates to Google Play Policies,” available at <https://support.google.com/googleplay/android-developer/answer/9934569#zippy=%2Csummary-of-changes%2Cjanuary.>

<sup>562</sup> See Google, GOOG-PLAY-004702879, at 879 (“some app developers (especially multi-platform products) interpreted this [policy language] to mean that they [did] not have to use [GPB] at all.”).

<sup>563</sup> Google, “Play Billing Policy,” August 2019, GOOG-PLAY-003334312-347, at 316. Match Group withdrew its request for a temporary restraining order against Google on the basis that Google allows additional in-app payment mechanisms in its app. See Match Stipulation, ¶ 8; Email from Brandon Barras, Google, to Sameer Samat, Vice President of Product Management for Google, “Subject: Re: Tinder and Google Play Billing [Concern],” June 27, 2017, GOOG-PLAY-000840773-782, at 779 (“Match Group’s remaining major brands (Match.com, PlentyOfFish and Meetic) have resisted adoption of GPB due to a robust existing payment infrastructure and then the lack of desire to pay the 30% rev share”); and Google, “Google / Match Group Exec Summit August 2019,” August 2019, GOOG-PLAY-002438751-754, at 753 (“In April, Tinder removed Google Play In-App Billing as the default billing solution in favor of their native solution”).

<sup>564</sup> Google, “Neal/Scott briefing on Play – YT integration,” June 11, 2020, GOOG-PLAY-000416238-244, at 243 and Google, “Play and YT – Towards a Resolution,” GOOG-PLAY-002618277-278, at 277. Google listed one of the drawbacks of YouTube integrating Play Billing as “YT will have to maintain one integration with Play for digital goods transactions, and a separate integration with Wallet for non-digital goods[.]” See Email from Jamie Rosenberg, Vice President of Strategy and Operations (Platforms and Ecosystems Division) for Google, to Sundar Pichai, Google, “Subject: Re: YT and wallet/billing,” October 5, 2014, GOOG-PLAY-000077271-273, at 272. See also Google, “Buy Flow Discussion,” GOOG-PLAY-001088593-601, at 593-596.



Director of Product Management for Google Play, Sam Tolomei, Play Apps BD Manager at Google, wrote that “Calm told me in-person that they are exploring ‘*other billing options*’, which I think may include testing going off GPB in these markets... If Calm goes off GPB in a market, I expect that other players in health/fitness will notice, and also go off GPB (Strava, Headspace have both complained about GPB before).”<sup>565</sup>

256. Different pricing strategies for app distribution services and in-app billing services imply that providers for these services belong to separate product markets. For example, Google has internally evaluated different monetization strategies for “Google billing + Google distribution,” stating: “Google splits sales 70/30” for developers “using our billing,” whereas “Google charges a fixed per-user install fee” for developers “not using our billing (or not billing at all).”<sup>566</sup> In 2019, an internal Google email further discusses ways to value Google Play Billing, with options including “1. Our cost[;] 2. Match competitive payment systems[;] 3. Value based on Devs ability to Replicate.”<sup>567</sup> In a July 2020 deck on negotiations with Spotify, Google attempted to quantify how much of its commission was attributable to distribution on the Google Play Store as compared to payment processing with Google Play Billing; Google proposed countering with █ percentage points of its commission reflecting payment processing and █ percentage points reflecting “the value realized of operating the platform, distribution, publishing, updating, loyalty, and investing in the user experience”:

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<sup>565</sup> Email from Sam Tolomei, Play Apps Business Development Manager at Google, to Paul Feng, Director of Product Management for Google Play, “Subject: Calm – International Expansion Concerns on Google Play,” May 1, 2019, GOOG-PLAY-000259640-647, at 643 and Google, “Project Basecamp – Optionality,” GOOG-PLAY-006829073.R-172.R, at 085.R.

<sup>566</sup> Google, “Apps Marketplace Monetization Ideas,” January 26, 2009, GOOG-PLAY-004630018.R-032.R, at 025.R; Google, “Project Basecamp – Optionality,” April 14, 2021, GOOG-PLAY-006829073.R-172.R at 083.R (“A fixed service fee representative of the value of Play beyond Billing” and “Play Billing priced separately”).

<sup>567</sup> Email from Michael Marchak, Director of Play Partnerships, Strategy and Operations at Google, to Joshua O’Connor, Google, “Re: Value of Billing,” May 14, 2019, GOOG-PLAY-000934804-805, at 804.

**Exhibit 33**  
**Google's Counter Proposal for Spotify**

**Proposed Scenario for Counter Proposal**

	Spotify	Google
Processing	[REDACTED]	[REDACTED]
Service fee	[REDACTED]	[REDACTED]

Questions we've spent time on:

- How do we frame this to Spotify?

[REDACTED] Google

**Potential framing:** [REDACTED]

[REDACTED]

We believe these fees represent value delivered of enabling Spotify to scale to over 2 billion users effectively and driving new paying subscribers globally"

Source: Google, "Modular Google Play Billing EAP Pre-BC Exec Review," July 27, 2020, GOOG-PLAY-004692994.R-017.R, at 998.R.

257. Another internal Google document from 2020 explored potential changes to the 30% commission structure by proposing [REDACTED] possible from [REDACTED] such as creating a [REDACTED] and proposed [REDACTED] in the event that [REDACTED]

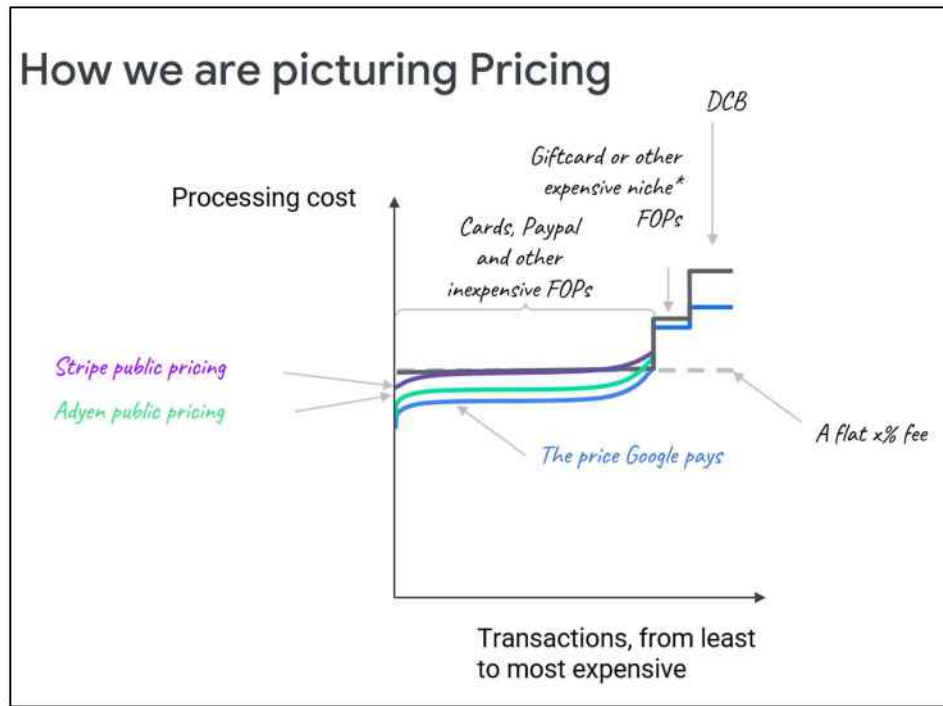
568

<sup>568</sup> Google, "Project Runway: Proposal for changes to Play business models," November 16, 2020, GOOG-PLAY-007337179-213, at 181 and 183.

258. In addition, ONE store in South Korea charges a 20% commission for in-app digital purchases and further reduces the commission to 5% for developers who use their own billing systems.<sup>569</sup>

259. Second, the similar costs between third-party billing service providers and Google Play Billing suggest they belong to the same relevant product market. By comparing its own billing to Stripe, Adyen, and PayPal in terms of processing costs, Google identifies these billing service providers as potential competitors.<sup>570</sup> Exhibit 34 below from Google's internal document illustrates this point.

**Exhibit 34**  
**Google Recognizes Billing Service Providers are Potential Competitors**



<sup>569</sup> Na, Hyun-joon and Minu, Kim, "Korean app market One Store vows to go global in 2022 with more popular games," *Pulse*, August 24, 2021, available at <https://pulsenews.co.kr/view.php?year=2021&no=816068>.

<sup>570</sup> Google, "Project Basecamp – Optionality," April 14, 2021, GOOG-PLAY-006829073.R-172.R at 081.R. See also, Email from Greg Funk, Google, to Samer Sayigh, Google, "Subject: RE: SDK scanning for alternative payment mechanisms in app," February 9, 2018, GOOG-PLAY-000258450-450, at 450.

Source: Google, “Project Basecamp – Optionality,” 4/8 discussion, GOOG-PLAY-006829073.R-172.R, at 081.R.

b) Android App Stores Do Not Always Include Mandatory Android In-App Billing Services

260. Indirect evidence of demand also shows that the Google Play Store and Google Play Billing are separate products because Android app stores—including the Google Play Store itself—have not always bundled that app store’s Android in-app billing services as a condition of Android App Distribution. For example, Android Market (the precursor to the Google Play Store), which launched in 2008, did not offer in-app billing services until 2011.<sup>571</sup> Additionally, other Android app stores have unbundled publication on their store from using the app store’s Android in-app billing services. The ONE store, for example, which is pre-installed on all Android smart mobile devices sold by SK Telecom, KT, and LG U+, allows for various billing options for in-app purchases of digital content, such as credit cards, Naver Pay, Syrup Pay, and ONE Pay.<sup>572</sup> The Epic Games Store also offers a proprietary payment system for in-app purchases but does not mandate its use.<sup>573</sup>

261. Over time, Google has monitored which developers are not complying with its Google Play Billing policies, and, in instances in which app developers have not been fully compliant (*i.e.*, they adopted alternative payment methods for digital in-app purchases), Google has informed such developers to comply with its rules and transition to Google Play Billing for digital in-app purchases. For example, a Google document from 2017 contains “Play Policy Feedback” for

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<sup>571</sup> Google, “Android Market: Now available for users,” October 22, 2008, available at <https://android-developers.googleblog.com/2008/10/android-market-now-available-for-users.html> and Chu, Eric, “In-app Billing Launched on Android Market,” *Android Developers*, March 29, 2011, available at <https://android-developers.googleblog.com/2011/03/in-app-billing-launched-on-android.html#:~:text=Today%2C%20we%27re%20pleased%20to,purchases%20from%20within%20your%20apps>.

<sup>572</sup> Google, “Project Banyan Ecosystem Fact Packs,” Q1 2019, GOOG-PLAY-001139437.R-531.R, at 460.R-469.R.

<sup>573</sup> CMA Final Report on Mobile Ecosystems, ¶ 4.205 and Appendix H, ¶ 24 and Valentine, Rebekah, “Epic Games Store implements in-game purchases for third-parties,” *Gamesindustry.biz*, December 6, 2019, available at <https://www.gamesindustry.biz/articles/2019-12-06-epic-games-store-implements-in-game-purchases-for-third-parties> (“The Epic Games Store has updated its policy to allow its third-party developers and publishers to implement in-game purchases within their titles on the store. Developers and publishers can either use Epic-provided payment services or set up their own functionality. If they opt for the latter, they will not need to share any revenue with Epic on in-game transactions.”).

numerous developers, which includes integration status, concerns, likelihood that the developer will move to consumption only, prerequisites needed for GPB integration, and “indications of anticipated timeline for GPB integration” for numerous developers.<sup>574</sup> Similarly, in 2021, Google set a target date of March 31, 2022, for about 250 developers who had not been compliant with Google Play Billing policies, including [REDACTED]

[REDACTED] to enable changes to become fully compliant.<sup>575</sup> In response, by February 2021, [REDACTED]

[REDACTED]<sup>576</sup> By March 2021, [REDACTED] of the non-compliant developers confirmed that they planned to be 100% compliant.<sup>577</sup> Another Google document includes a Google billing policy compliance tracker, with deadlines for developers who have previously used third party billing services for in-app purchases to adopt Google Play Billing. The tracker targets 100% compliance by March 31, 2022.<sup>578</sup>

262. In November 2021, Google announced a program in South Korea in response to legislation requiring that Google allow developers to offer an “alternative in-app billing system, alongside Google Play’s billing system, for their mobile and tablet users in South Korea.”<sup>579</sup> Google has taken similar steps in the European Economic Area.<sup>580</sup> Google also explored the possibility of using Google Play Billing to support purchases made in apps downloaded from the

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<sup>574</sup> See Google, “Play Policy Feedback,” November 8, 2017, GOOG-PLAY-000442329-350, at 329-343.

<sup>575</sup> Google, “Billing Policy Compliance,” January 2021, GOOG-PLAY-006817773.R-890.R, at 776.R-777.R, 838.R, and 867.R-868.R.

<sup>576</sup> Google, “Billing Policy Compliance,” January 2021, GOOG-PLAY-006817773.R-890.R, at 861.R.

<sup>577</sup> Google, “Billing Policy Compliance,” January 2021, GOOG-PLAY-006817773.R-890.R, at 833.R.

<sup>578</sup> See Google, “GPB Policy Compliance Tracker Dashboard,” GOOG-PLAY-002291709.R-715.R, at 710.R.

<sup>579</sup> White, Wilson, “Enabling alternative billing systems for users in South Korea,” Google, November 4, 2021, available at <https://developers-kr.googleblog.com/2021/11/enabling-alternative-billing-in-korea-en.html>.

<sup>580</sup> Werth, Estelle, “An update on Google Play billing in the EEA,” *Google*, July 19, 2022, available at <https://blog.google/around-the-globe/google-europe/an-update-on-google-play-billing-in-the-eea/> (“This will mean developers of non-gaming apps can offer their users in the EEA an alternative to Google Play’s billing system when they are paying for digital content and services. . . . When a consumer uses an alternative billing system, the service fee the developer pays will be reduced by 3%. Since 99% of developers currently qualify for a service fee of 15% or less, those developers would pay a service fee of 12% or lower based on transactions through alternative billing for EEA users acquired through the Play platform”).

Samsung Galaxy Store as part of Project Banyan.<sup>581</sup> Google’s internal documents note that “by decoupling [Google Play from Google Play Billing] we align with the vision that Play is not GPB” and that the “Play platform value is more than payment processing.”<sup>582</sup>

263. Further, Google has more recently explored decoupling Google Play Billing from purchases of digital content via apps downloaded from the Google Play Store. On March 23, 2022, Google announced User Choice Billing, a pilot program that would “allow a small number of participating developers to offer an additional billing option next to Google Play’s billing system.”<sup>583</sup> The first developer partner in the program is Spotify.<sup>584</sup> Additionally, Google’s Product Management Director for Google Play Commerce, Mrinalini Loew, testified that Google Play Billing is not currently available in every country where the Google Play Store is in use, thereby demonstrating they are two separate products with separate demand.<sup>585</sup>

264. Finally, Google currently only requires the use of Google Play Billing for purchases of digital content, not for purchases of physical goods or services (e.g., ride-share purchases).<sup>586</sup>

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<sup>581</sup> Rosenberg (Google) Deposition, p. 100 (“Q. Did Project Banyan include a proposal for the Galaxy Store and the Play Store to use one in-app billing module? A. The proposal essentially was that, to the extent that Samsung had an interface or an experience that they called the Galaxy Store and they promoted and merchandised apps or content, that content, those apps, would be fulfilled by the Play Store’s back end which, you know, and for those apps that used Play’s billing system, then Play’s billing system would be the billing system for those apps”).

<sup>582</sup> Google, “Spotify – Next Steps,” December 2020, GOOG-PLAY-006997722-751, at 725.

<sup>583</sup> Samat, Sameer, “Exploring User Choice Billing with First Innovation Partner Spotify,” *Android Developers*, March 23, 2022, available at <https://android-developers.googleblog.com/2022/03/user-choice-billing.html>.

<sup>584</sup> Samat, Sameer, “Exploring User Choice Billing with First Innovation Partner Spotify,” *Android Developers*, March 23, 2022, available at <https://android-developers.googleblog.com/2022/03/user-choice-billing.html> and Google, “Spotify – Google Play Better Together Program Partnership (‘Program’) Addendum to the Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-011250116-166, at 116-119.

<sup>585</sup> See, e.g., Loew (Google) Deposition, p. 199 (“Q And is Google Play Billing available in every country where Google Play is available? A Google Play Billing is not available in every country that Google Play is available. Q Google Play Billing is not available in about 50 countries where Google Play is available. Does that sound right? A I don't know the list off the top of my head, so I can't say yes or no. Q But there are some number of countries where Google Play is available and Google Play Billing is not available; correct? A That is correct.”).

<sup>586</sup> Google makes exceptions to its 30% commission for purchases that “must not” use Google Play Billing. See Google, “Google Play Payments Policy,” available at <https://support.google.com/googleplay/android-developer/answer/9858738> and Google, “Understanding Google Play’s payments policy – Frequently asked questions,” available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en-GB#zippy=%2Ccan-i-offer-a-consumption-only-reader-app-on-google-play>. (“Google Play allows any app to be consumption-only, even if it is part of a paid service. For example, a user could log in when the app opens and access content paid for somewhere else”).



Developers selling physical goods and services to be consumed outside apps through Android apps can choose from several existing billing service providers with much lower commissions (including PayPal, Adyen, Worldpay, Braintree, and Stripe), or they can implement their own solutions. As presented in Exhibit 8 in Section III.D, these third-party payment processors charge fees generally equal to or below a percentage of 2.99% plus 49 cents per transaction.

265. Conversely, Google records identified 100 “top” apps that are not listed on the Google Play Store but nevertheless use Google Play Billing to consummate in-app purchases.<sup>587</sup> Google recognized this problem in a September 2017 presentation, where it sought “to link use of Play IAB with distribution by Play” with a proposed policy change that “IAB will not be available for apps that have not been installed via Play: ‘You don’t get to use our IAB if you didn’t use our distribution.’”<sup>588</sup> This too shows separate demand for separate products.

266. Thus, from both a demand and supply perspective, Android In-App Billing Services for the purchase of digital in-app content is a separate and distinct product from Android App Distribution.

### 3. *Android In-App Billing Services is a One-Sided Market Between Developers and Service Providers*

267. Indirect network effects are not important for the developer as purchaser of Android in-app billing services because the value to the developer of the billing services does not change based on the number of buyers in the market. Unlike the Android App Distribution Market, where

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<sup>587</sup> Google, “PPS: Blocking IAP from sideloaded apps,” September 2017, GOOG-PLAY-002405918.R-947.R, at 925.R; and Feng (Google) Deposition, p. 285 (“Q. Okay. Google at one point learned, did it not, that developers were distributing apps through direct downloads that incorporated Play billing; right? A. I believe so, yes. I think that we know that to be true.”); Loew (Google) Deposition pp. 192-193 (“Q. But are there any apps that are no longer distributed through the Google Play Store that utilize Google Play Billing? A. It’s technically possible, I suppose. I don’t know for how long. That’s a level of detail I don’t have. But in order for Google Play Billing to work, you must have an active Play developer account and a signed Google Play app.”).

<sup>588</sup> Google, “PPS: Blocking IAP from sideloaded apps,” September 2017, GOOG-PLAY-002405918.R-947.R, at 921.R; Google, “User experience with sideloaded apps,” June 2018, GOOG-PLAY-001264185-191, at 189 (“any app can use IAP flows, even if they were sideloaded ... [I]n 2017, there were discussions about only enabling IAP for apps acquired through Play ... These changes were implemented in the code base, but never rolled out for production users.”); and Feng (Google) Deposition, p. 438.



developers seek app stores with the largest potential customer base and consumers pick app stores based on the number of developers using that app store,<sup>589</sup> here the developer's choice of billing service provider is independent of how many other parties may be using that same provider. Rather, the choice depends on criteria such as fees and the consumer experience provided. The billing service provider is therefore a vendor to the developer, who purchases this billing service as an input to the in-app content product sold to users (as well as being part of the experience that the app provides to consumers, *i.e.*, a low-friction purchase process that is seamless for the user).

268. In addition, there is no platform intermediary between the developer and the Android in-app billing services provider that controls their relationship. Billing service providers control their own prices, which developers contract for and pay.<sup>590</sup> This suggests that the Android In-App Billing Services Market is one-sided.

269. Finally, the output of Android in-app billing services is agnostic to price structure, which also suggests a one-sided market. Unlike an app store, which can charge higher prices to developers in order to subsidize negative prices to consumers, Android in-app billing services providers do not incentivize consumers in the same way. Consumers do not buy in-app billing APIs or receive transaction tokens.<sup>591</sup> When Google does not foreclose rivals from the market, Android In-App Billing Service providers offer pricing incentives and quality of service solely to win sales to developers.

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<sup>589</sup> Email from Hiroshi Lockheimer, Senior Vice President of Platforms and Ecosystems for Google, to Stephanie Saad Cuthbertson, Google, "Subject: Re: android monetization," GOOG-PLAY-000813755-756, at 755 ("One of the ways in which we make money is via Play -- having a healthy app ecosystem is important, and these developers need to be productive. So it's less about "adoption" per se, and more direc[tly] about having a thriving app ecosystem so that app developers see value, which in tum leads to \$\$\$ for us too").

<sup>590</sup> Stripe offers a pay-as-you-go pricing schedule for developers without setup fees, monthly fees, or hidden charges. *See*, for example, Stripe, "Pricing," available at <https://stripe.com/pricing>.

<sup>591</sup> Loew (Google) Deposition pp. 49 and 86 ("Q. And what is the mechanism by which they – the purchaser receives the token? How does that work? A. So the user, the purchaser never receives a token. It's – the purchase token is exchanged between Google, Google Play, and the developer.").

270. Therefore, as an economic matter, I analyze the Android In-App Billing Services Market as a traditional one-sided market involving Android app developers and billing service providers.<sup>592</sup>

#### 4. *Alternative Relevant Markets for In-App Billing Services*

271. I also consider whether Apple's in-app billing or exiting an app to complete a payment transaction should be included in the relevant market. I conclude that neither should be included in the relevant antitrust market for Android In-App Billing Services.

272. Apple's in-app billing system is not an option for Android developers. As discussed above, Apple's in-app billing system is embedded exclusively into iOS apps distributed on the Apple App Store.<sup>593</sup> Even if Apple did license its in-app purchase solution for Android smart mobile devices, the SDK or APIs for that solution are incompatible with apps programmed to run on Android.<sup>594</sup> Developers who want to distribute their apps for Android, therefore, cannot use Apple's in-app billing system.

273. Billing service options that require exiting the Android app to complete a purchase, while possible, are not a sufficient competitive constraint on Google Play Billing. Evidence suggests that friction during the checkout process leads to customers abandoning their order.<sup>595</sup>

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<sup>592</sup> Note that this market does not include all developers, as some developers do not monetize their in-app content, choosing to either monetizing the initial purchase of the app, or providing the app for free – perhaps as a service to an existing customer base (e.g., a banking app), or monetizing their app in other ways (e.g., through advertising).

<sup>593</sup> Apple operates its own proprietary in-app billing service—"In-app purchase." See Apple, "In-app purchase," available at <https://developer.apple.com/in-app-purchase/>. See also Spotify, "Complaint of Spotify AB against Apple INC.," April 9, 2019, STATEAGS\_0015939-995, at 942 ("This is the case for all purchases of digital content and functionality made in-app on iOS native apps (e.g., e-books, music, access to content, in-game currencies, game levels, and subscriptions to services)").

<sup>594</sup> Brady (Google) Deposition, p. 72 ("So part of the friction for developers that you were describing is having to design different apps for different mobile operating systems. Right? A. Yup, that's correct").

<sup>595</sup> Pasquali, Marina, "Main reasons why consumers in the United States abandoned their orders during the checkout process in the United States in 2022," *Statista*, June 24, 2022, available at <https://www.statista.com/statistics/1228452/reasons-for-abandonments-during-checkout-united-states/>; Alzetta

Similar to the impact of frictions on app distribution described in Section V.B.2, because seamless payments are an important input into an app's user experience, frictions that discount the user experience likely lead to consumers abandoning in-app purchases that cannot be completed within the app, as recognized in academic literature on frictions.<sup>596</sup> Google has recognized as much too.<sup>597</sup> For example, in a presentation titled "App Best Practices for Commerce developers," in a slide titled "Removing friction," Google highlights that "by removing form filling friction and steps to purchase, conversions can increase anywhere from [REDACTED]"<sup>598</sup> Google's Eric Chu also noted during his deposition that "the more friction there is the more likely [they] lose users along the buy flow."<sup>599</sup>

274. Moreover, payment methods by means of hyperlinks, websites, and even cash are not embeddable into apps and will likely cause interruptions to the user experience.<sup>600</sup> A Google internal document discussing payment frictions from a "Web Only" development flow, notes that

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(Spotify) Deposition pp. 151-52 ("Q. While that is loading, Ms. Alzetta, has Spotify historically used website transactions as a place for users to upgrade from the free product to the premium product? A. It's available to our users to do so. It's not the preference for users. From our perspective, you're finding yourself in the situation whereby that's the only choice a user has, has without question an impact on our business. Not all users want to do that. It's inconvenient for them which introduces significant friction."); Perryman (Netflix) Deposition pp. 69-70 ("Q Okay. So there was some expectation at least that having the availability of an in-app payment method would provide more users overall than not having any in-app method at all? A Absolutely. There's less friction. If you have billing within the app, you're going to get more sign-ups.").

<sup>596</sup> Transaction convenience, especially the speed and ease with which consumers complete transactions, is an important component of consumers' shopping experience. See Seiders, Kathleen, Leonard L. Berry, and Larry G. Gresham, "Attention, retailers! How convenient is your convenience strategy?" *Sloan Management Review*, Vol. 41, No. 3, 2000, pp. 79-89, at p. 87.

<sup>597</sup> Lim (Google) Deposition, pp. 258-259 ("[M]ore steps typically leads to lower conversion"); Google, "xCloud Meeting Notes," April 30, 2020, GOOG-PLAY-004691145-146, at 145 ("IAP[s] are critical to the success of the service, and consumption only is not viable"); and Google, "Project Basecamp: Principles-Play Leads Discussion 5/7," GOOG-PLAY-007628059-070 at 065. Some developers such as Hulu and Sling TV admitted that "going consumption only is also a terrible user experience." See Google, "Accelerators 2.0 Proposal," August 29, 2019, GOOG-PLAY-001283119-123, at 120 and Google, "Sameer Meeting Presented on 5/26/21," May 26, 2021, GOOG-PLAY-007745035-079, at 036-040.

<sup>598</sup> Google, "App Best Practices for Commerce developers," GOOG-PLAY-000942553.R-586.R, at 570.R.

<sup>599</sup> Chu (Google) Deposition, p. 259.

<sup>600</sup> Perez, Sarah, "Google to allow users to pay for Android apps using cash," *Tech Crunch*, May 8, 2019, available at <https://techcrunch.com/2019/05/08/google-to-allow-users-to-pay-for-android-apps-using-cash/>.

including multiple payment flows (*i.e.*, web and native app) could create a poor user experience.<sup>601</sup> For these reasons, I exclude hyperlinks/websites that direct consumers outside of the app for processing payments or options to pay with cash from the Android In-App Billing Services Market.

### 5. *Geographic Market*

275. The relevant geographic market for the Android In-App Billing Services Market is worldwide excluding China. First, billing service providers offer their services worldwide. The Google Play Store distributes apps on Android OS in over 135 countries around the world.<sup>602</sup> Therefore, Google Play Billing, tied to the Play Store, is used by Android developers worldwide for transactions related to in-app digital content, in the countries where it is available. Senior executives at Google Play and Payments recognize that “[t]he Play Billing policy has a huge positive value to Google” and seek to “establish our retail/payment solutions to the world.”<sup>603</sup> Moreover, concerns related to the exclusive use of Google Play Billing as well as Google’s 30% commission are seen in

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<sup>601</sup> Google, “Google Play Payment Policy,” December 18, 2017, GOOG-PLAY4-002610426-439, at 431. Google also recognized that “forcing users out of [the] app” is one type of friction that “creates lose-lose situation for users and developers” in mobile in-app purchases. *See* Google, “Play Market Opportunities,” August 2020, GOOG-PLAY-005578403.R-450.R, at 410.R; and “Defendant Google LLC, Google Ireland Limited, Google Commerce LTD, Google Asia Pacific PTE. LTD. And Google Payment Corp.’s Responses and Objections to Match’s First Set of Interrogatories to Defendants, *Match Group LLC. et al. v. Google LLC et al.*, the United States District Court Northern District of California San Francisco Division, Case No. 3:21-md-02981-JD, July 27, 2022, p. 20 (describing in-app links to a payment flow outside the app as “ultimately a poor user experience.”).

<sup>602</sup> Android Developers, “Google Play Billing,” available at <https://developer.android.com/distribute/play-billing>.

<sup>603</sup> Email from Andrew Zaeske, Director of Engineering for Google, to Eric Chu, Engineering Director for Meta Platforms and former Director of the Android Developer Ecosystem for Google, “Subject: Re: buy-flow/ policy 3-team sync (Monday),” June 6-7, 2020, GOOG-PLAY-000051084-088, at 087.

countries such as South Korea and India.<sup>604</sup> In addition, competing billing service providers such as Adyen, PayPal, and Stripe, offer their services in a worldwide market.<sup>605</sup>

276. Second, China is excluded from the Android In-App Billing Services geographic market because it has a distinct market for in-app billing services given that the Google Play Billing APIs that come as part of GMS are inaccessible in China to date (setting aside piracy of Google apps and APIs).<sup>606</sup> Google internally recognizes that “a Google certified China device with Play Services is not a thing.”<sup>607</sup> The different operators in the Chinese market include WeChat Pay and Alipay, which are not supported by app stores outside China.<sup>608</sup> Therefore, I find that China should be excluded from the geographic market for Android In-App Billing Services.

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277. Based on the evidence presented above, I find the Android In-App Billing Services Market worldwide excluding China is a relevant antitrust market. The market for Android in-app transactions is separable from the market for Android App Distribution to the extent that third-party billing service providers and developers’ own billing systems sufficiently meet developers’ demand for Android in-app billing services and are considered as substitutes for Google Play Billing. I also find that Android in-app billing services are distinct from (i) Apple’s in-app billing system, and (ii)

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<sup>604</sup> Singh, Manish, “Google delays mandating Play Store payments rule in India to April 2022,” *Tech Crunch*, October 4, 2020, available at <https://techcrunch.com/2020/10/04/google-policy-cut-india-paytm-mini-app-store/> and Perez, Sarah, “Google Play to support alternative billing systems in South Korea, following new law,” *Tech Crunch*, November 4, 2021, available at <https://techcrunch.com/2021/11/04/google-play-to-support-alternative-billing-systems-in-south-korea-following-new-law/>.

<sup>605</sup> For example, Adyen is available in Europe, Mexico, Brazil, China, and Southeast Asia. PayPal is available globally in more than 200 countries/regions. Stripe operates in 47 countries. *See, e.g.*, Adyen, “Country guides,” available at <https://www.adyen.com/knowledge-hub/country-guides>; PayPal, “We get where you’re coming from,” available at [https://stripe.com/global](https://www.paypal.com/uk/webapps/mpp/country-worldwide#:~:text=We%20are%20available%20in%20more,over%20borders%20and%20language%20barriers; and Stripe, “In your country,” available at <a href=).

<sup>606</sup> Google, “Supported locations for distribution to Google Play users,” available at <https://support.google.com/googleplay/android-developer/answer/10532353?hl=en> (As shown in the table, users in China “may not download paid apps. Attempts to make in-app purchases on Google Play will fail.”).

<sup>607</sup> Email from Andy Dyer-Smith, Google, to Matt Goodridge, Google, “Subject: Re: [Shenlong] Accessing G suite within China Best Practices doc is ready to publish!” January 23, 2017, GOOG-PLAY-000976171-173, at 171.

<sup>608</sup> AppInChina, “Accepting Payments in China,” available at <https://www.appinchina.co/services/monetization/in-app-purchases/>.

billing services via hyperlinks or websites, which, I find, are not viable alternatives. Further, billing service providers offer their services worldwide, with the exception of China where Google Play Billing is restricted and Chinese in-app billing service providers, who do not operate outside China, dominate.

## **VI. Google has Monopoly Power in the Relevant Antitrust Markets**

278. I now turn to assessing whether Google has monopoly power—*i.e.*, sufficient market power to profitably impose durable prices that are higher (or equivalently, to reduce quality, choice, or innovation) than competitive levels and/or to exclude competition in the relevant antitrust markets identified above.

279. I understand from counsel that market power and monopoly power are two related but distinct terms under the law. U.S. antitrust authorities have defined market power as “the ability profitably to maintain prices above competitive levels for a significant period of time”<sup>609</sup> and monopoly power as “the long term ability to raise price or exclude competitors.”<sup>610</sup> Economists do not recognize a qualitative distinction between market power and monopoly power. So-called “monopoly power” as the courts appear to define it would be referred to by economists as a very high degree of durable market power. I use the term “market power” in that sense for the sake of clarity in this report.

280. An evaluation of market power typically considers a firm’s share of the relevant market and whether there are barriers to entry or expansion that limit the ability of potential entrants to discipline price. That is because a dominant market share alone does not reliably indicate that a firm’s market power is tenable in the event of new entrants. Only with substantial barriers to entry

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<sup>609</sup> U.S. Department of Justice and the Federal Trade Commission, “Horizontal Merger Guidelines,” April 8, 1997, available at [https://www.justice.gov/atr/horizontal-merger-guidelines-0#N\\_6\\_](https://www.justice.gov/atr/horizontal-merger-guidelines-0#N_6_), § 0.1.

<sup>610</sup> Federal Trade Commission, “Monopolization Defined,” available at <https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws/single-firm-conduct/monopolization-defined>; *See also*, Fisher, Franklin, “Diagnosing Monopoly,” *Journal of Reprints for Antitrust Law and Economics*, Vol. 27, 1997, p. 692 (“Monopoly power is the power to maintain a high share and earn supranormal profits without being better”).

can one infer that a dominant firm has monopoly power and the ability to exercise it.<sup>611</sup>

Additionally, any assessment of market or monopoly power should also consider any available direct evidence, *e.g.*, a “firm’s price and output decisions,” and “documentation of recognition of market power in a firm’s price setting and other marketing decisions, coupled with the market’s acceptance of those decisions, provides evidence of some market power.”<sup>612</sup>

281. Based on my analysis detailed below, I find Google has monopoly power in Android App Distribution and Android In-App Billing Services.

#### **A. Google has Monopoly Power in Android App Distribution**

282. In this section, I provide both structural and direct evidence demonstrating Google has monopoly power in the Android App Distribution Market.

##### *1. Google Imposes a Supracompetitive Commission on Google Play Store Purchases And Earns Extraordinarily High Profits*

283. Google’s monopoly power in Android App Distribution is demonstrated by Google’s ability to impose a supracompetitive commission via the use of Google Play Billing on paid downloads in the Google Play Store (see Section VII.B). As depicted in Exhibit 35, using Google’s transaction data, which includes Google Play transactions by U.S. consumers from 2012 to 2021, Google’s average commission on paid downloads was generally close to 30%.

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<sup>611</sup> Fisher, Franklin, “Diagnosing Monopoly,” *Journal of Reprints for Antitrust Law and Economics*, Vol. 27, 1997, p. 687 (“[T]he role of entry plays a major part in any assessment of monopoly power. Where entry is easy, no monopoly power can persist. Where entry is difficult, provided there are not already many competitors, monopoly power can survive... Clearly then, correct analysis of entry or barriers to entry lies at the heart of an assessment of monopoly power” ).

<sup>612</sup> Schmalensee, Richard, “Another Look at Market Power,” *Harvard Law Review*, Vol. 95, No. 8, 1982, pp. 1789-1816, at p. 1807; Baker, Jonathan B. and Timothy F. Bresnahan, “Economic Evidence in Antitrust: Defining Markets and Measuring Market Power,” in *Handbook of Antitrust Economics*.



**Exhibit 35**



*Note:* The data includes worldwide developers. All transactions relate to U.S. consumer transactions.

*Source:* Google Transaction Data.

284. Google has characterized its 30% commission on developers' app revenues in the Play Store as "an arbitrary fee."<sup>613</sup>

285. Google is able to charge this supracompetitive commission despite lower commissions offered by alternative Android app stores. For example, as described in Section V.D.2, the One store in Korea charges 20% (and only 5% if a developer chooses their own billing solution). That Google was able to maintain its supracompetitive commission in the Google Play Store despite lower commissions from alternative Android app stores over the same period is indicative of Google's monopoly power in Android App Distribution.

286. I note that starting on July 1, 2021, after or around the time of the commencement of related private and public enforcement actions such as this case, Google announced that "the service fee for each developer will be 15% for the first \$1M (USD) of earnings" and 30% for earnings in excess of \$1 million.<sup>614</sup> In a competitive market, prices are set in relation to marginal cost. I am unaware of any explanation by Google of how a reduction in the marginal cost of serving developers below the \$1 million threshold drove this change. These special commission rates appear to be akin to price discrimination, which means pricing according to a customer's

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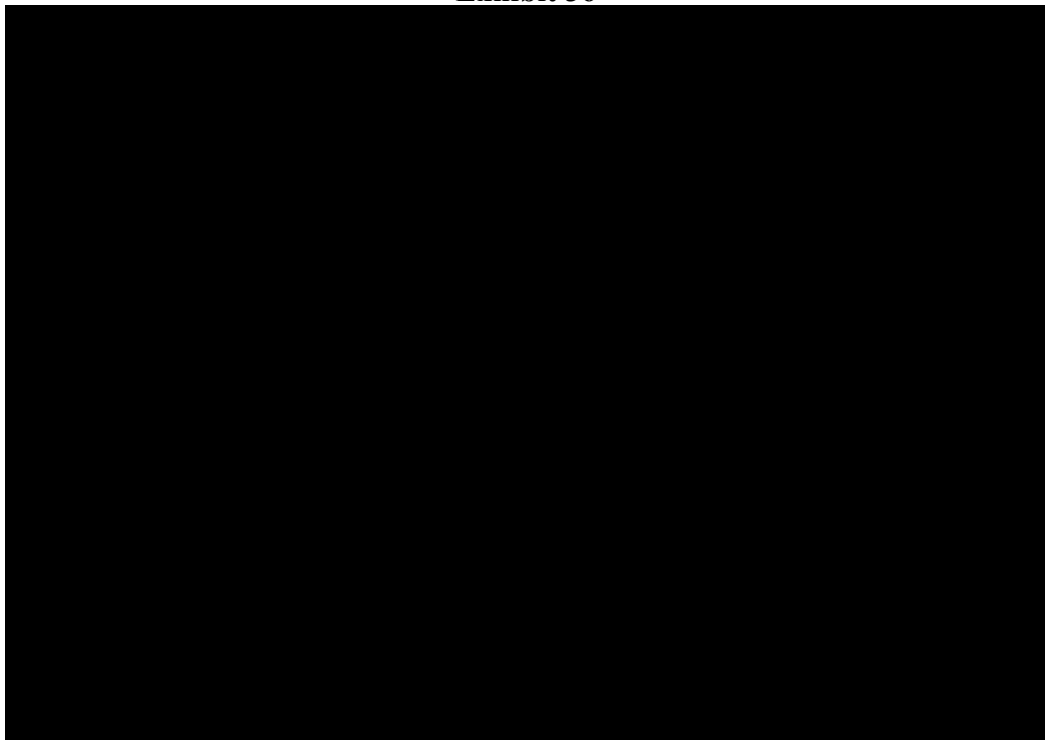
<sup>613</sup> See, Google, "Apps Marketplace Monetization Ideas," January 26, 2009, GOOG-PLAY-004630018.R-032.R, at 024.R; See also Google, Untitled, GOOG-PLAY-004506631-633, at 631. ("The pricing (30% rev share on in app purchases) feels arbitrary and high to developers.").

<sup>614</sup> See, Google, "Changes to Google Play's service fee in 2021," available at <https://support.google.com/googleplay/android-developer/answer/10632485?hl=en>.

willingness to pay.<sup>615</sup> It is widely accepted in economics that price discrimination can exist only if a firm has market power.<sup>616</sup> Thus, I find this change in commission rates does not demonstrate competition but instead demonstrates the reverse. Moreover, as depicted in Exhibit 36, using the Google transaction data, I find that by 2021 only [REDACTED] of developers on average pay a commission lower than 30%; thus, [REDACTED] of developers on average pay a 30% commission. And, as noted in Exhibit 35 above, the average commission on paid downloads across developers was [REDACTED] in 2021.

287. The fact that developers with elastic or low demand for the Google Play Store can negotiate lower rates does not mean that Google lacks market power or that competition in Android App Distribution is unnecessary. These deviations from the standard commission rate apply to a very small share of developers.

#### Exhibit 36



<sup>615</sup> Google, “Accelerator Programs 2.0 aka Project Secret Carrots,” GOOG-PLAY-007329063-073, at 064 (“[M]any partners can not do 30% rev share, so must have lower %”).

<sup>616</sup> See, Varian, Hal R, "Price discrimination," in *Handbook of Industrial Organization*, Vol 1, Eds. R. Schmalensee and R.D. Willig, Elsevier Science Publishers B.V., 1989, pp. 597-654, available at [https://doi.org/10.1016/S1573-448X\(89\)01013-7](https://doi.org/10.1016/S1573-448X(89)01013-7).

*Notes:*

1. The data includes worldwide developers. All transactions relate to U.S. consumer transactions.
2. The commission rate is rounded to the nearest 1%. I further discuss the profitability of Google's commission in Section VI.C below.

*Source:* Google Transaction Data.

288. Additionally, a comparison of Google's commission in the Google Play Store to various competitive benchmarks illustrates that Google's commission on Android App Distribution through the Google Play Store is supracompetitive. In Section VII.B.3, I provide an analysis of commissions imposed by platforms that face competition, including the Microsoft Store, which imposes a 15% commission for apps and a 12% commission for games; the Epic Games Store, which imposes a 12% commission; and the Game Jolt store, which imposes a commission below 10%.<sup>617,618</sup> I show that Google's average commission of 29.6% on app downloads in 2021 is considerably higher than the commissions imposed by these platforms that face competition.<sup>619</sup>

289. Further evidence of Google's market power in Android App Distribution comes from Google's change in revenue sharing with MNOs. As noted in Section IV.B.5 and further in Section

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<sup>617</sup> See e.g., Sardo, Giorgio, "Building a new, open Microsoft Store on Windows 11," June 24, 2021, available at <https://blogs.windows.com/windowsexperience/2021/06/24/building-a-new-open-microsoft-store-on-windows-11/>; Epic Games, "Frequently Asked Questions," available at <https://store.epicgames.com/en-US/publish>; "Revenue Split," available at <https://gamejolt.com/marketplace>. See also CMA Final Report on Mobile Ecosystems, ¶ 4.205.

<sup>618</sup> Google internally evaluated that changing to a 20% revenue-share will "[b]ring Play rev share in line with upper end of desktop gaming stores[.]" Google, "Exploring new business models," March 2019, GOOG-PLAY-000542516.R-535.R at 529.R.

<sup>619</sup> See Exhibit 35 and Exhibit 69.

VII.A.1, Google [REDACTED] gave a [REDACTED] commission to MNOs, such as [REDACTED] and AT&T<sup>620</sup>, as explained in Section IV.B.5.<sup>621,622</sup> below:

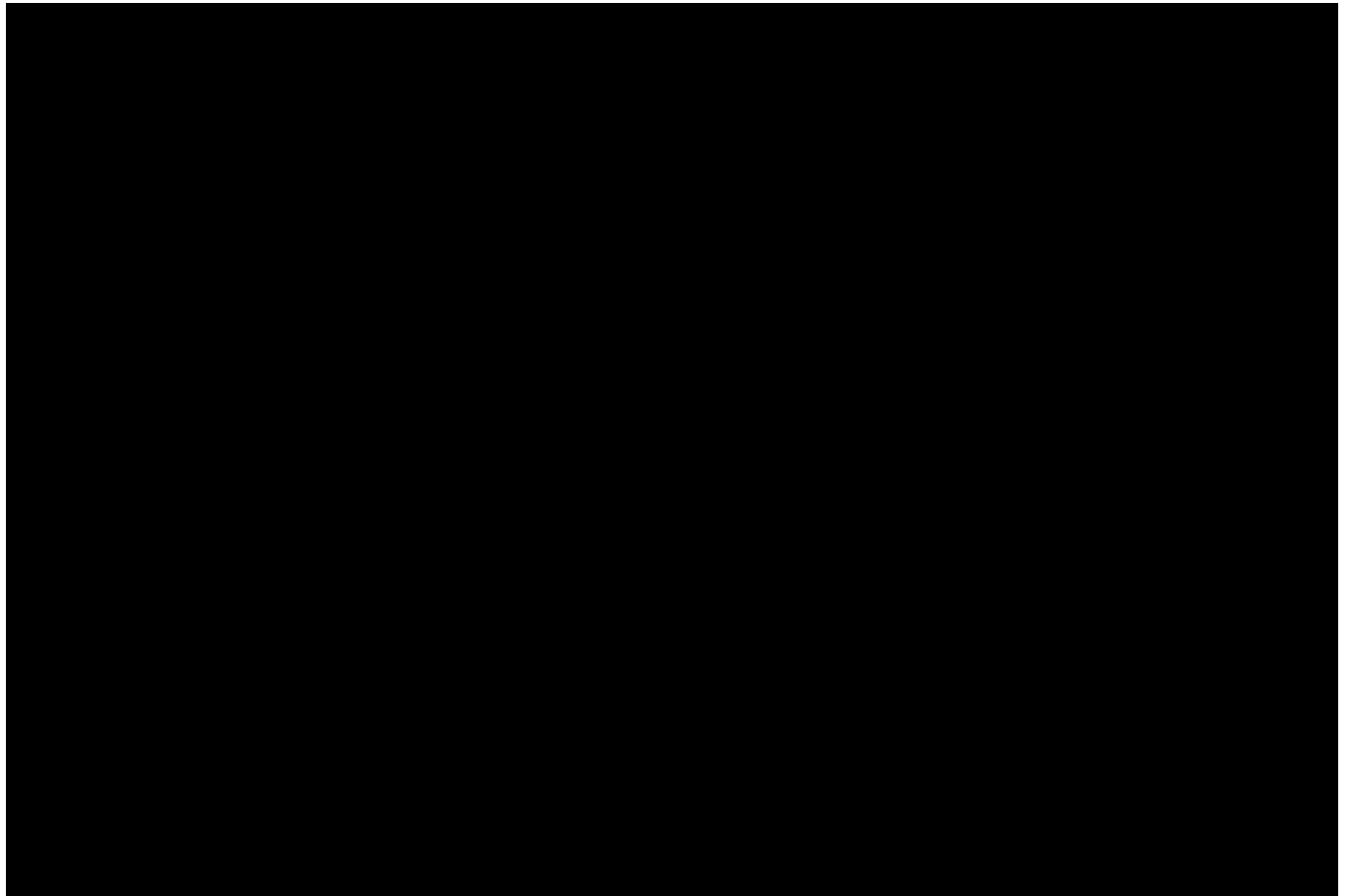
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<sup>620</sup> See, Google, “Android Partnerships Strategy Rethink,” May 6, 2015, GOOG-PLAY-001184813-857, at 824. *See also* Google, “Carrier rev-share evaluation,” October 2012, GOOG-PLAY-003772918.R-925.R, at 919.R (“We pay 25%+ rev-share on 63% of US spend”).

<sup>621</sup> [REDACTED]

<sup>622</sup> Feb. 15, 2022 letter from B. Rocca to M. Coolidge (explaining that before “2018, when a consumer enrolled in a direct carrier billing plan paid for an app, in-app content, or subscription purchase for an app distributed through Google Play . . . Google would share a portion of the revenue from that transaction with the carrier.”). As indicated by Google Transaction Data, the last day of carrier billing payments is January 22, 2018. *See* Google Transaction Data. *See* Rysman Workpapers.

**Exhibit 37**



*Note:* The data includes worldwide developers. All transactions relate to U.S. consumer transactions.

*Source:* Google Transaction Data.

290. Yet, instead of reducing the commission to developers by the amount it no longer paid to carriers, or even a portion of it, Google retained the entirety of the amount previously paid to carriers, thereby providing indication of its market power.<sup>623</sup>

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<sup>623</sup> PX1098, Email from Jon Gold to Cristina Bitá, GOOG-PLAY-003741416, at -417; PX1091, Email from Jon Gold to Jon Gold, GOOG-PLAY-003762336 (explaining that Google saved [REDACTED] in cost of sales from renegotiating [REDACTED] + rev share deals).

## 2. *High Margins are Indicative of Market Power*

291. This evidence of the Google Play Store’s supracompetitive commission rates should be viewed alongside evidence of Google Play Store’s very high profit margins. As noted above, in economics, a firm’s market power is the ability to consistently raise price profitably above marginal cost (or alternatively the competitive level). In highly competitive markets price will tend to be driven towards marginal cost, so a firm sustaining price above the competitive level / marginal cost must have some market power.<sup>624</sup> Therefore, very high profit margins may indicate that a firm is exercising a high degree of market power.

292. Lerner (1934) proposed a price-cost margin index for measuring market power, noting that for a profit maximizing firm, the index is equal to the inverse of a firm’s price elasticity of demand.<sup>625</sup> This makes it explicit that the more inelastic the demand for its product, the greater a firm’s price-cost margin, and therefore the greater a firm’s market power.

293. One way to see why profit margins are a reliable measure for market power is to consider what happens to margins as a market moves from perfect competition towards monopoly. Under perfect competition, price equals marginal cost and firms earn zero profits and hence have zero economic profit margins. As competition becomes weaker (*e.g.*, the number of firms in a market decreases), profit margins increase for firms in the market because they face less competitive pressure and become more able to raise prices above competitive levels.

294. Profit margins can also convey more information about market power than market shares or elasticities alone. When a firm profit maximizes, the profit margin can be shown to be a function of market elasticity of demand, rival firms’ elasticity of supply, and market share of the firm.<sup>626</sup> Each of these components affects the profit margin in an intuitive manner – profit margins

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<sup>624</sup> Landes, William M. and Richard A. Posner, “Market Power in Antitrust Cases,” *Harvard Law Review*, Vol. 94, No. 5, 1981, pp. 937-996 (hereafter “Landes and Posner (1981)”), at pp. 937-939.

<sup>625</sup> In two-sided markets, the ability of a monopolist to price above its marginal cost is inversely related to the price elasticity of demand. *See* Jullien, Pavan & Rysman (2022), p.13. *See also*, Landes and Posner (1981), pp. 939-940. *See also*, Lerner, A.P., “The Concept of Monopoly and the Measurement of Monopoly Power,” *The Review of Economic Studies*, Vol. 1, No. 3, 1934, pp. 157-175, at p. 169.

<sup>626</sup> *See* Kaplow, Louis, “Why (Ever) Define Markets?” *Harvard Law Review*, Vol. 124, No. 2, 2010, pp. 437-517 (hereafter “Kaplow (2010)”), at pp. 451-452.

increase with the firm's market share but decrease with the market elasticity of demand and rivals' elasticity of supply. Hence, a firm's profit margin is a measure of market power that can account for all three different factors that may affect a firm's ability to set prices consistently above competitive levels.

295. Google's supracompetitive commission generated high margins for Google. Google's profit and loss statements (P&L) for Google Play, Google's other internal documents, and testimony all show that Google Play has maintained high profit margins. Exhibit 38 shows Google Play's revenues, costs, gross profit margins, and operating profit margins from 2013 to 2021 (excluding ads<sup>627</sup>), based on the Google Play P&L.<sup>628</sup> It shows that, for example, from 2018 to 2021 Google Play's operating profit margins had been [REDACTED], consistently increasing over time and reaching [REDACTED] in 2021.<sup>629</sup> Importantly, the reason for increasing operating profit margins was not decreasing costs, as they also increased consistently across the relevant period.

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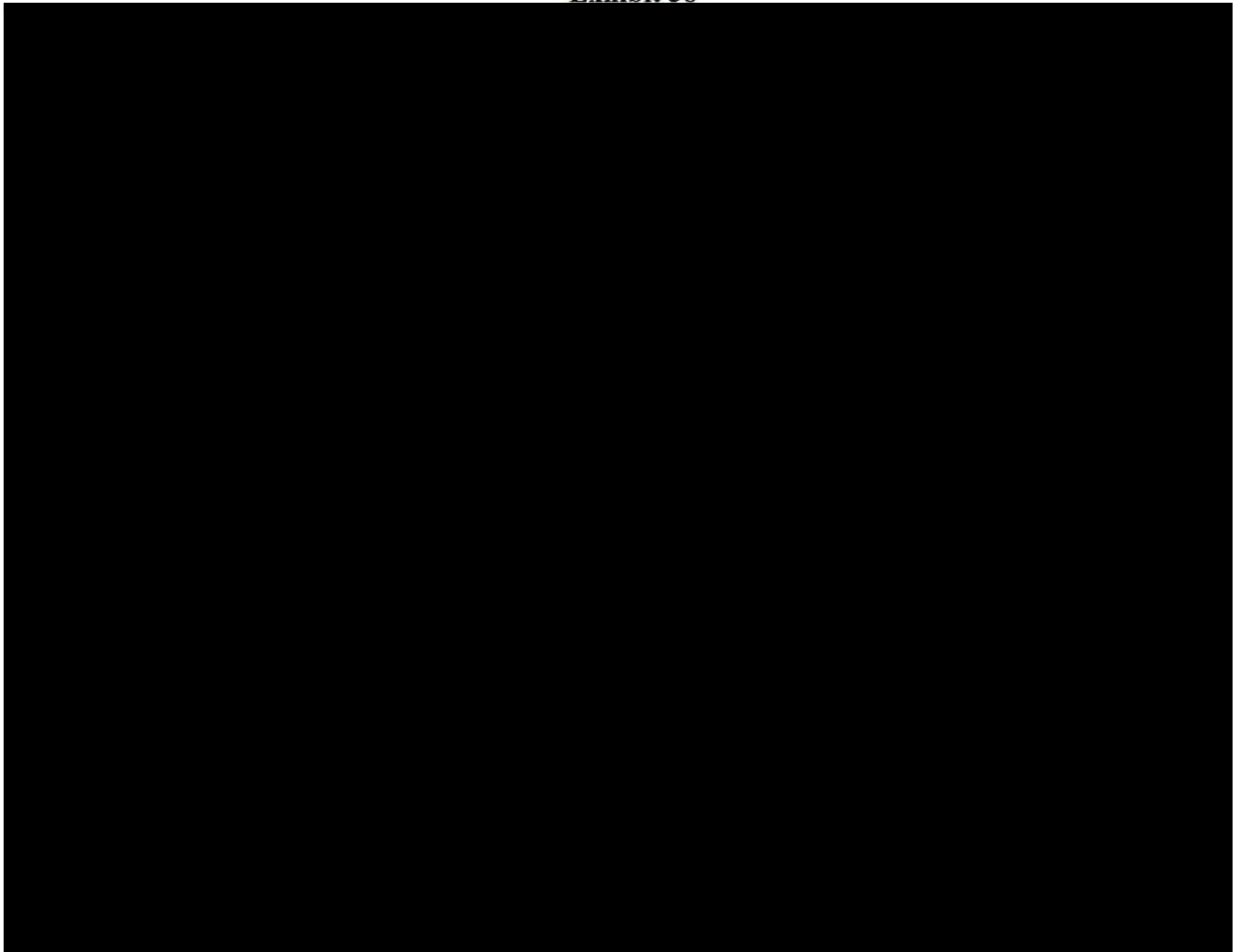
<sup>627</sup> As discussed below, Google Play margins with ads are even higher.

<sup>628</sup> I have started the time series in 2013 as that was the first year Google reached scale (>\$1bn in revenue). Operating profits were negative in both 2011 and 2012, as Google was still growing the Play Store (and its market share), which is not as indicative of Google's current market power. *See* Rysman Workpapers.

<sup>629</sup> However, I understand Google admits that data on the Play P&L was prepared for litigation. *See* Defendants' Responses and Objections to State Plaintiffs' Second Set of RFAs, No. 20 (explaining that PX428, GOOG-PLAY00041624, the Play P&L statement, "was not created in the ordinary course of Google's business; rather it was created to respond to Plaintiffs' discovery requests.").



**Exhibit 38**



296. I have also looked at the operating profit margins for Play Store ads. Google's P&L data suggest that the operating profit margins were even higher for Play Store ads – above [REDACTED] [REDACTED] between 2018 and 2021 – than Google Play Store.<sup>630</sup> Thus, including ads would only increase Google Play Store's profit margins.

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<sup>630</sup> See Google, "Ads Revenue and Costs on Play Store," GOOG-PLAY-001090227 for 2018-2020 data; and GOOG-PLAY-010801680 for 2021 data. Note that these spreadsheets do not contain Google's calculations of operating profit

297. While accounting profits can deviate from economic profits and it is important to consider other evidence, I find that Google's high accounting margins are consistent with the other evidence I provide of Google's market power.

298. In addition to detailed P&L information, Google's internal documents also show high operating profit margins for Google Play. Exhibit 39 shows Google Play's profitability separately for Apps and Games (A&G), Ads, Videos, and Books, clearly highlighting that the margins are driven by [REDACTED].<sup>631</sup> Google estimates that in 2019 the A&G operating profit margin was [REDACTED] percent and the Ads operating profit margin was [REDACTED] percent. For Videos and Books, one can see that operating profits are approximately [REDACTED]

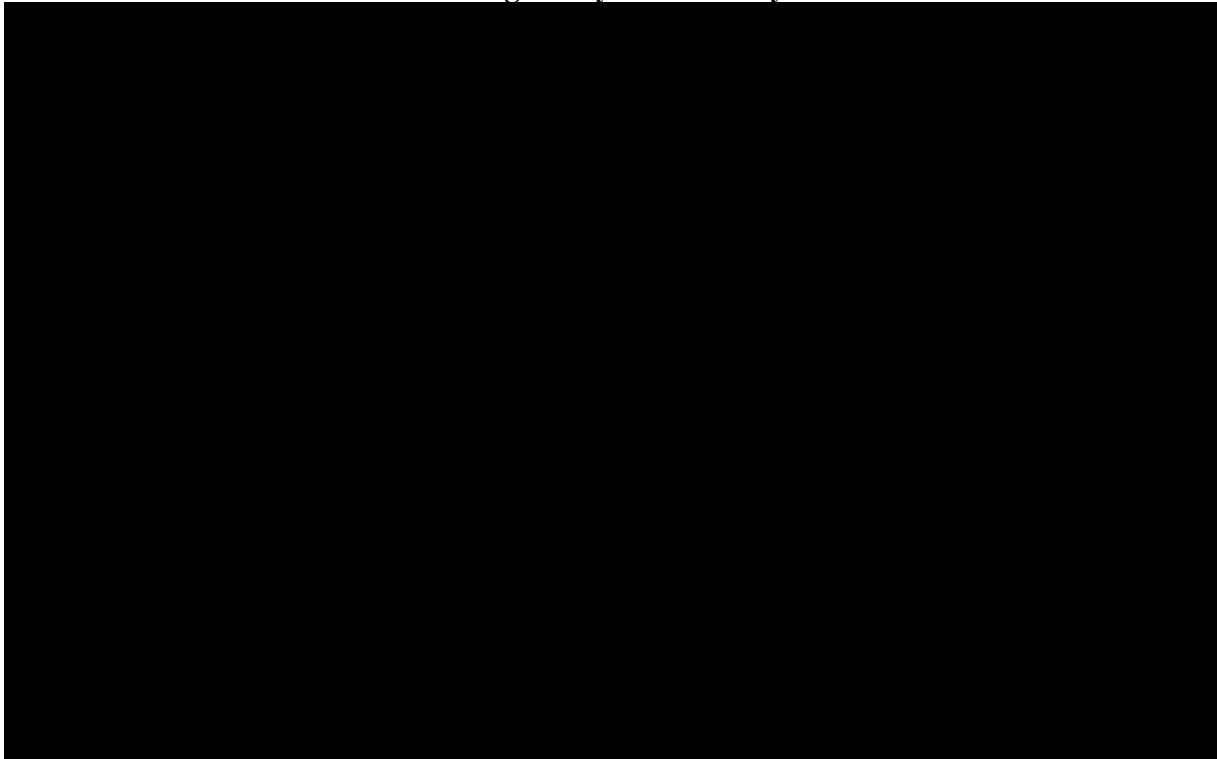
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margins. The spreadsheets contain revenue, total opex, and cost of sales data based on which I have estimated the margins as follows. In 2018, the ad revenues on Play Store were [REDACTED]. Given these, I estimate that in 2018, Google's operating profit margin for ads on Play Store was about [REDACTED] percent. Similarly, I calculate the margins for 2019, 2020, and 2021 to be about [REDACTED], respectively (equal to  $[(2,517-6-111)/2,517]$ ,  $[(3,487-6-252)/3,487]$ , and  $[(5,724-126-255)/5,724]$ , respectively).

<sup>631</sup> The exhibit is from a summary slide deck of P&L, prepared by Google in 2019 in the ordinary course of business. Google, "2019 Play P&L Review," July 2019, GOOG-PLAY-000559534.R-557.R, at 539.R; *See* Cramer (Google) Deposition, pp. 206-207.

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**Exhibit 39**  
**Google Play Profitability**



*Source:* Google, “2019 Play P&L Review,” July 2019, GOOG-PLAY-000559534.R-557.R, at 539.R.

299. Finally, Jamie Rosenberg, VP of Strategy and Operations for Platforms and Ecosystems at Google, testified Google Play margins are “substantial.”<sup>632</sup>

3. *Structural Evidence Demonstrates Google has Monopoly Power*

a) Google has a very high share of the Android App Distribution Market

300. As noted in the introduction to Section VI above, in practice, a high market share, coupled with barriers to entry, also may be evidence of monopoly power. In this section, I establish that no matter the method of measurement, the Google Play Store dominates the Android App Distribution Market at levels commonly associated with monopoly power. Indeed, Google itself recognizes the Google Play Store’s dominance and high share of Android App Distribution,

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<sup>632</sup> Rosenberg (Google) Deposition, p. 399.

claiming internally that the “Play Store dominates in all countries,”<sup>633</sup> and that “Play is dominant for Android users because [it is] the default.”<sup>634</sup>

301. There are limited publicly available data on mobile app stores other than the Google Play Store and Apple App Store.<sup>635</sup> Firms that collect and produce publicly available data related to mobile app distribution generally fail to track alternative Android app stores, such as the Galaxy Store, Amazon Appstore, and F-Droid, thus indicating that such competitors are small and, by extension, that the Google Play Store is the dominant means of distributing Android mobile apps.

302. Notwithstanding the challenges from a lack of publicly available data, Google admits in internal documents that Play Store “dominates in all countries,” has “[o]verwhelming market share,” and is “the preeminent distribution platform for Android.”<sup>636</sup> Google also collects and analyzes data that provide various measures of market share. Across these measures, Google’s own analyses show that it has significant and durable market shares in the worldwide (excluding China) Android App Distribution Market while alternative Android app stores had minimal share. The following measures are covered in further detail below: (i) overall share of Android app store installations; (ii) share of Android app store pre-installations (iii) shares of Android app downloads; (iv) shares of consumer expenditure on Android apps; and (v) shares in terms of user engagement with apps on their Android smart mobile devices, including visits to Android app stores and time spent on Android app stores.

303. **App Store Installations: 100%.** In terms of app store installations, Google describes in a 2019 internal presentation that the Google Play Store is “installed on ~100%” of Android smart mobile devices worldwide excluding China.<sup>637</sup> In contrast, as summarized by the

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<sup>633</sup> See Google, “Google Play Competitive Usage Survey,” GOOG-PLAY-001886111.R-166.R, at 118.R.

<sup>634</sup> See Google, “Pre-quants learnings -KR, TW (Mar 2016) Play APAC Segmentation Study,” March, 2016, GOOG-PLAY-000299564-570 at 569.

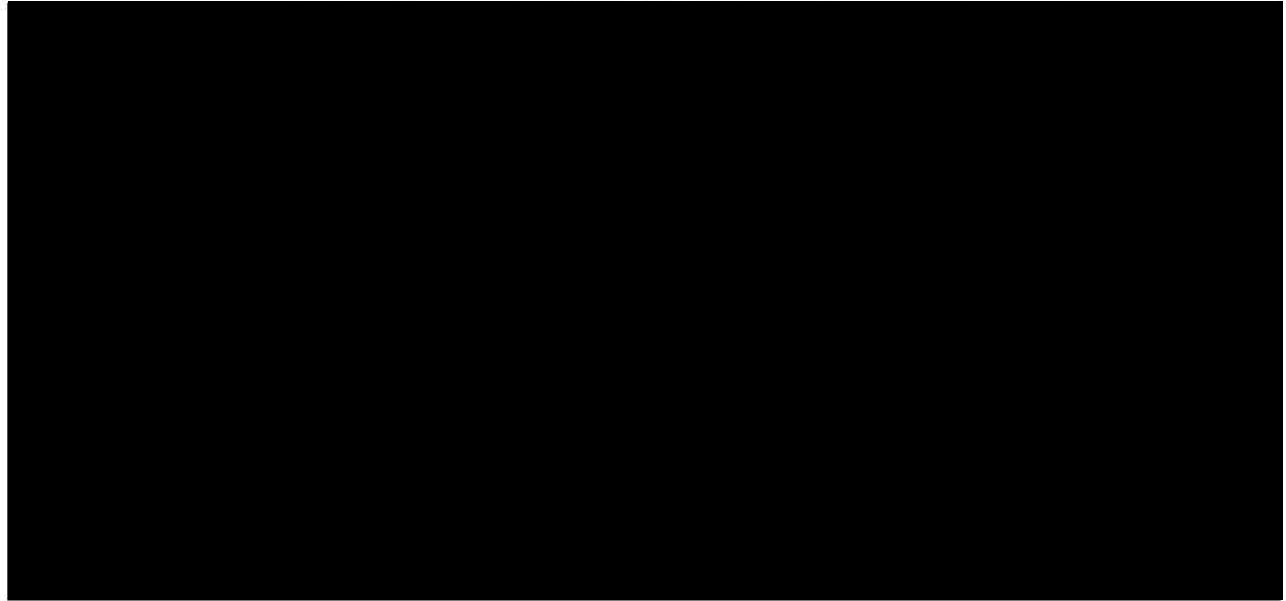
<sup>635</sup> For example, Sensor Tower, a major provider of mobile app data and information, only track Apple App Store and Google Play Store. See e.g., Sensor Tower, “2021 – 2025 Mobile Market Forecast,” 2021.

<sup>636</sup> Google, “Google Play Competitive Usage Survey,” GOOG-PLAY-001886111.R-166.R, at 112.R and 118.R; Google, “Project Banyan,” January, 2019, GOOG-PLAY-01111808-864, at 813.

<sup>637</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 227.R.

table below, Google data show that the Amazon Appstore was installed on less than 1% of active Android smart mobile devices in 2021 and LG's app store was installed on less than 3% of active devices since 2017. The Samsung Galaxy Store, despite being installed on around 40% of Android smart mobile devices, achieves only a small share in terms of app store usage, as explained below. As Google notes, the Google Play Store is commercially important to OEMs and developers because of its "enormous reach" while being "installed on over two billion devices."<sup>638</sup>

#### Exhibit 40



#### Notes:

1. Shares are calculated as the total number of devices with the respective app store active divided by the total number of devices with the Play Store active, which approximately equals the number of Android smart mobile devices.
2. Data are yearly snapshots from December 31<sup>st</sup> (for 2015-2020) or July 1<sup>st</sup> (for 2021).

Source: GOOG-PLAY-010801683.

304. **App Store Pre-Installations:** [REDACTED]. Google's [REDACTED] installed base is supported by the fact that OEMs pre-install the Google Play Store on [REDACTED] of the Android mobile devices worldwide (excluding China). The Google Play Store's substantial market power in terms of Android app downloads makes it an essential app store for OEMs to pre-install on their

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<sup>638</sup> See Google, "Android OC Quarterly Review—Q4 2010," October 12, 2010, GOOG-PLAY-001430401-442 at 412 ("We created the first app store for Android and it got critical mass quickly. The store now has value and partners want access to it because of the number of apps available."). See also Google, "Play Global KOC Research," GOOG-PLAY-009245422-443 at 429.

Android smart mobile devices. This conclusion is consistent with the EC’s findings of market shares in the Android App Distribution Market. Data on app store pre-installations on Android mobile devices (worldwide excluding China) from 2011 to 2016, show that the Google Play Store was pre-installed on 90-100% of all Android mobile devices over the same time period. No other Android app store was able to achieve a similarly high rate of pre-installations. The second most commonly pre-installed Android app store, the Samsung Galaxy Store, was pre-installed on [REDACTED] of Android mobile devices, while all other app stores (including the Amazon Appstore and F-Droid) were pre-installed on less than [REDACTED] of Android mobile devices.<sup>639</sup>

305. **App Store Visits:** [REDACTED] OEMs can install their own app stores on their devices (subject to being paid not to do so by Google). Yet, despite being pre-installed on [REDACTED] of Android smart mobile devices, the Galaxy Store still only achieved at most [REDACTED] share of monthly app store visits, relative to Play Store. In contrast, according to a 2019 Google presentation, [REDACTED] of monthly app store visits on Samsung smart mobile devices, which have the Samsung Galaxy Store pre-installed, are to the Google Play Store.<sup>640</sup> According to the same presentation, the same holds for visits on Xiaomi smart mobile devices (outside of those in China): [REDACTED] of monthly app store visits on these devices are to Xiaomi Market, and [REDACTED] to Google Play Store, as summarized in Exhibit 41 below.<sup>641</sup> Further, a 2019 Google presentation reflects that [REDACTED] “of all app store visits in a month are to Play Store,” while only [REDACTED] of Android users’ app store visits are to the Samsung Galaxy Store and 1% to Xiaomi Market.<sup>642</sup> The same document reflects that “almost all active users” of Android smart mobile devices visit the Google Play Store [REDACTED] each month.<sup>643</sup> In a 2019 Google “OEM App Store Share Analysis,” Google finds “the [REDACTED] of all app store visits in a month are to Play Store.”<sup>644</sup> The same analysis determined that the sum of users’

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<sup>639</sup> See, EC Google Android Decision, ¶¶ 591-598.

<sup>640</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 227.R, 229.R and 230.R.

<sup>641</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 229.R-230.R.

<sup>642</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 229.R.

<sup>643</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 228.R.

<sup>644</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 229.R.



monthly visits to certain OEM app stores (including the Samsung Galaxy Store) averages less than [REDACTED] of total monthly visits at the global level and that [REDACTED] of users' monthly app store time is spent on the Google Play Store.<sup>645</sup>

**Exhibit 41**  
**Google 2019 Internal Analyses of OEM App Store Pre-Installation Shares**  
**Worldwide (excluding China), 2019**

	Google Play Store	Samsung Galaxy Store	Xiaomi Market	Oppo Apps	Vivo App Store
% of Android smart mobile devices with the app store pre-installed	[REDACTED]				
% of monthly app store visits from Android smart mobile devices with the app store pre-installed	[REDACTED]				

*Source:* Google, "OEM App Store Share Analysis," October 31, 2019, GOOG-PLAY-002076224.R-238.R at 227.R, 229.R-231.R.

306. **Android App Downloads: 97%.** The Google Play Store has a high share of Android app downloads.<sup>646</sup> In 2020, 109 billion apps were downloaded from the Google Play Store worldwide (excluding China).<sup>647</sup> Based on available data, I estimate that the total number of non-

<sup>645</sup> Google, "OEM App Store Share Analysis," October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 236.R.

<sup>646</sup> This conclusion is consistent with the EC's findings of market shares in the Android App Distribution Market. Data on apps downloaded via Android app stores (worldwide excluding China) from 2011 to 2016, show that 90-100% of all apps downloaded on Android devices were downloaded via the Google Play Store. All other Android app stores (including the Samsung Galaxy Store, Amazon Appstore, and Aptoide) achieved at most 10% collective market share over the same time period, with none individually achieving more than 5% (with the exception of Amazon in 2011 – [5-10%]). *See*, EC Google Android Decision, ¶¶ 591-598.

<sup>647</sup> In 2020, 34 billion apps were downloaded in the Apple App Store worldwide and 8.2 billion in China. Therefore, 25.8 billion apps were downloaded worldwide, excluding China. 109 billion apps were downloaded in the Google Play Store in 2020 worldwide, which excludes China. *See* Sensor Tower, "2021 – 2025 Mobile Market Forecast," 2021, pp.7 and 23.



Apple app downloads worldwide (excluding China) was around 112 billion.<sup>648</sup> Therefore, I calculate that the Google Play Store's share of non-Apple mobile app downloads worldwide (excluding China) in 2020 was approximately 97%.<sup>649</sup>

307. **Consumer Expenditure: 90%.** The Google Play Store has a high share of consumer expenditure on Android mobile apps. In 2020, consumer mobile app expenditures in the Google Play Store were \$39 billion worldwide (excluding China).<sup>650</sup> During the same period, consumer mobile app expenditures in the Apple App Store were \$52 billion worldwide (excluding China),<sup>651</sup> and total mobile app expenditures worldwide (excluding China) were around \$95 billion.<sup>652</sup> Therefore, conservatively assuming that the portion of consumer mobile app expenditures not in the Google Play Store or the Apple App Store is spent in alternative Android app stores, I calculate that Google Play Store's share of Android consumer mobile app expenditures worldwide (excluding China) in 2020 is approximately 90% ( $= \$39 \text{ billion} / (\$95 \text{ billion} - \$52 \text{ billion})$ ).<sup>653</sup>

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<sup>648</sup> The total number of app downloads in China was 96.2 billion in 2020. iOS's market share in China was around 20% in June 2020. Using a conservative estimate of 25%, the number of non-iOS app downloads in China would be 72 billion (equal to  $(100\% - 25\%)$  of 96.2 billion). The total number of app downloads worldwide was 218 billion in 2020. Thus, the total number of non-iOS app downloads worldwide, excluding China, was 112 billion (equal to 218 billion minus 34 billion minus 72 billion). *See* Statista, "Market share of mobile operating systems in China from January 2013 to December 2021\*," July 27, 2022, available at <https://www.statista.com/statistics/262176/market-share-held-by-mobile-operating-systems-in-china/>; Statista, "Number of mobile app downloads worldwide from 2016 to 2021," 2022, available at <https://www.statista.com/statistics/271644/worldwide-free-and-paid-mobile-app-store-downloads/>; Pawar, Pramod, "App Revenue Statistics 2022 – Mobile Games, iOS App, Android, Google Play," August 16, 2022, available at <https://www.enterpriseappstoday.com/stats/app-revenue-statistics.html> (citing Business of Apps, "App Data Report (2022)," 2022).

<sup>649</sup> 97% equals 109 billion divided by 112 billion.

<sup>650</sup> In 2020, consumer mobile apps expenditures on the Apple App Store were \$72 billion worldwide and \$20 billion in China. Therefore, Apple App Store expenditures were \$52 billion worldwide (excluding China). Google Play Store expenditures in 2020 were \$39 billion worldwide (excluding China). *See* Sensor Tower, "2021 – 2025 Mobile Market Forecast," 2021, pp. 6 and 22.

<sup>651</sup> In 2020, consumer mobile apps expenditures in the Apple App Store were \$72 billion worldwide and \$20 billion in China. Therefore, Apple App Store expenditures were \$52 billion worldwide, excluding China. 2020 Google Play Store expenditures were \$39 billion worldwide, which excludes China. *See* Sensor Tower, "2021 – 2025 Mobile Market Forecast," 2021, pp. 6 and 22.

<sup>652</sup> Total app revenue in 2020 was around \$143 billion worldwide and around \$48 billion in China. Therefore, total app revenue worldwide, excluding China, was around \$95 billion in 2020. *See* Statista, "Worldwide consumer spending on mobile apps from 2016 to 2021," 2022, available at <https://www.statista.com/statistics/870642/global-mobile-app-spend-consumer/>; Stancheva, Terry, "17 App Revenue Statistics - Mobile Is Changing the Game in 2022," June 3, 2022, available at <https://techjury.net/blog/app-revenue-statistics/> (citing Business of Apps, "App Data Report (2022)," 2022).

<sup>653</sup> 89% equals \$39 billion divided by \$43.6 billion (the difference between \$95.6 billion and \$52 billion).

308. **User Engagement:** [REDACTED] In addition to percentage of visits, Google Play Store has a high share of user engagement measured as time spent on Android app stores. In terms of total time spent on each Android app store, according to a 2019 Google presentation, [REDACTED] of worldwide (excluding China) “monthly app store time spent is in Play Store.”<sup>654</sup> According to the same presentation, OEM app stores such as the Samsung Galaxy Store make up “only a small portion of app store engagement overall”<sup>655</sup> with only [REDACTED] of OEM app store time spent on the Samsung Galaxy Store and [REDACTED] on Xiaomi Market.<sup>656</sup> Google’s own assessments of the Play Store’s market share in terms of user engagement are summarized in Exhibit 42 below.

**Exhibit 42**  
**Google 2019 Internal Analyses of OEM App Store Usage Shares**  
**Worldwide (excluding China)**

	Google Play Store	Samsung Galaxy Store	Xiaomi Market	Oppo Apps	Vivo App Store
% of total monthly app store visits to the app store	[REDACTED]				
% of total monthly app store time spent on the app store	[REDACTED]				
% of monthly active Android users that are active at least once monthly on the app store	[REDACTED]				

*Source:* Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R at 228.R, 229.R, 236.R.

309. The possibility of sideloading does not alter my views about Google’s share of the market, or of its power in the market. Information on sideloading indicates that only a small share of apps are sideloaded. For example, according to the CMA’s analysis of Google internal data for February 2022, fewer than 5% of app downloads occurred via sideloading or via app stores that were not pre-installed by the OEM.<sup>657</sup> As explained by Amazon, “consumers rarely download an

<sup>654</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 236.R.

<sup>655</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 225.R.

<sup>656</sup> Google, “OEM App Store Share Analysis,” October 31, 2019, GOOG-PLAY-002076224.R-238.R, at 236.R.

<sup>657</sup> See CMA Final Report on Mobile Ecosystems, ¶¶ 4.

app store onto their mobile device when another app store was pre-installed,”<sup>658</sup> and thus sideloading an alternative Android app store is unlikely to constrain Google’s monopoly power in Android App Distribution. Data from Google further show that apps that were sideloaded or downloaded from app stores not pre-installed by an OEM are a small share of downloaded apps. In particular, as presented in Section V.C.2 above, around [REDACTED] of apps on active Android smart mobile devices were “downloaded by a user from non-Play sources, including from direct downloading and third-party app stores” from February 2019 to December 2020.<sup>659</sup> In general, sideloading as a percentage of total app installations lies well under 20% for most countries, as summarized in Exhibit 43 below. Moreover, as I discussed in Section IV.B.4 and explain further in Section VII.A.2, Google has engaged in specific actions, such as a series of pop-up warnings including a message that a user could impact the security of their mobile device, that limits sideloading by Android users.

**Exhibit 43**  
**Google Internal Analysis of App Installs via Sideloading, June 4, 2016 – October 7, 2016**

Number of Installations (in Millions)	Sideloading	Google Play Store	Other Pre-Installed App Stores
United States	195 (4%)	3,360 (77%)	832 (19%)
India	692 (18%)	2,690 (70%)	439 (11%)
Brazil	198 (7%)	2,170 (80%)	350 (13%)
Indonesia	312 (17%)	1,360 (74%)	172 (9%)
Russia	121 (8%)	1,170 (80%)	179 (12%)

*Source:* Google, “Off-Play Installs (a.k.a. Sideloading),” October 7, 2016, GOOG-PLAY-000042623.R-639.R, at 632.R.

310. **Consumer Preference: 90%.** Given Google’s advantages, it is unsurprising that a survey of consumers found that 90% of Android users downloaded apps through the Google Play Store most often, with only 4% using the Samsung Galaxy Store most often, 1% defaulting to the

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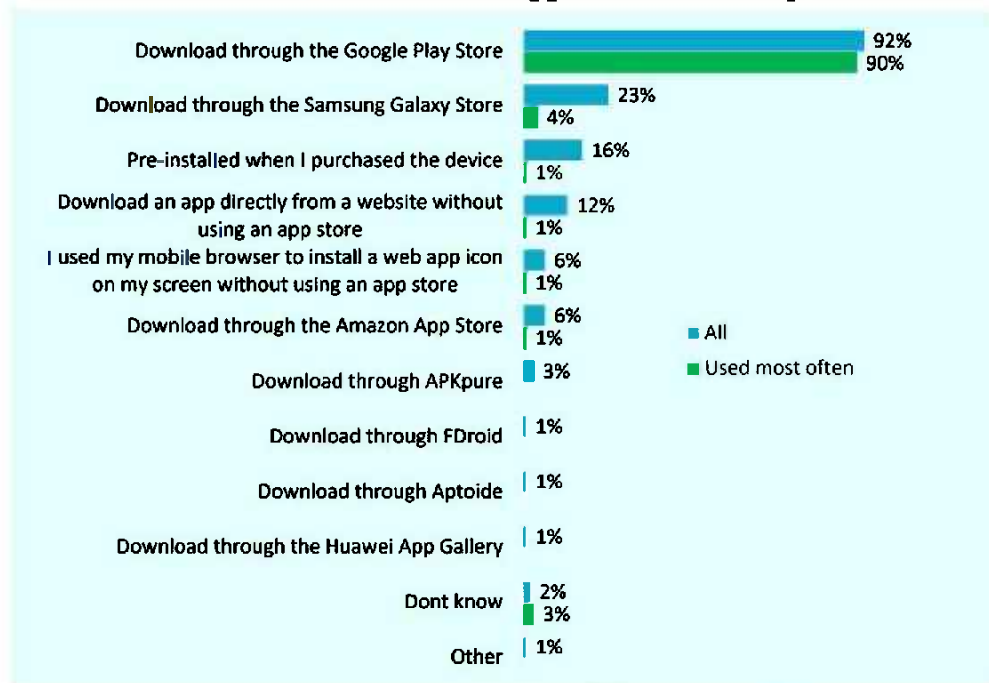
<sup>658</sup> EC Google Android Decision, ¶ 636.

<sup>659</sup> *See*, Footnote 356.



pre-installed apps, 1% using sideloading, and 1% using the Amazon App Store most often.<sup>660</sup> While 23% of Android users had used the Samsung Galaxy store, only 6% had used the Amazon store, 3% APK pure, 1% FDroid, 1% Aptoide, and 1% through the Huawei Gallery.<sup>661</sup> This is shown in Exhibit 44 below.

**Exhibit 44**  
**How Android users Install Apps on their Smartphones**



Source: CMA Consumer Survey, Figure 44.

311. **Number of Developers and Apps.** Moreover, given the importance of indirect network effects described in Section V.A.2 (the more apps available in an app store, the more attractive the app store is to users), the number of developers and apps available on the Google Play Store compared to alternative Android app stores should also be considered in evaluating Google's

<sup>660</sup> CMA Consumer Survey, Figure 44.

<sup>661</sup> CMA Consumer Survey, Figure 44.

market power. As Google notes, the Google Play Store is commercially important to OEMs and developers “because of the number of apps available.”<sup>662</sup>

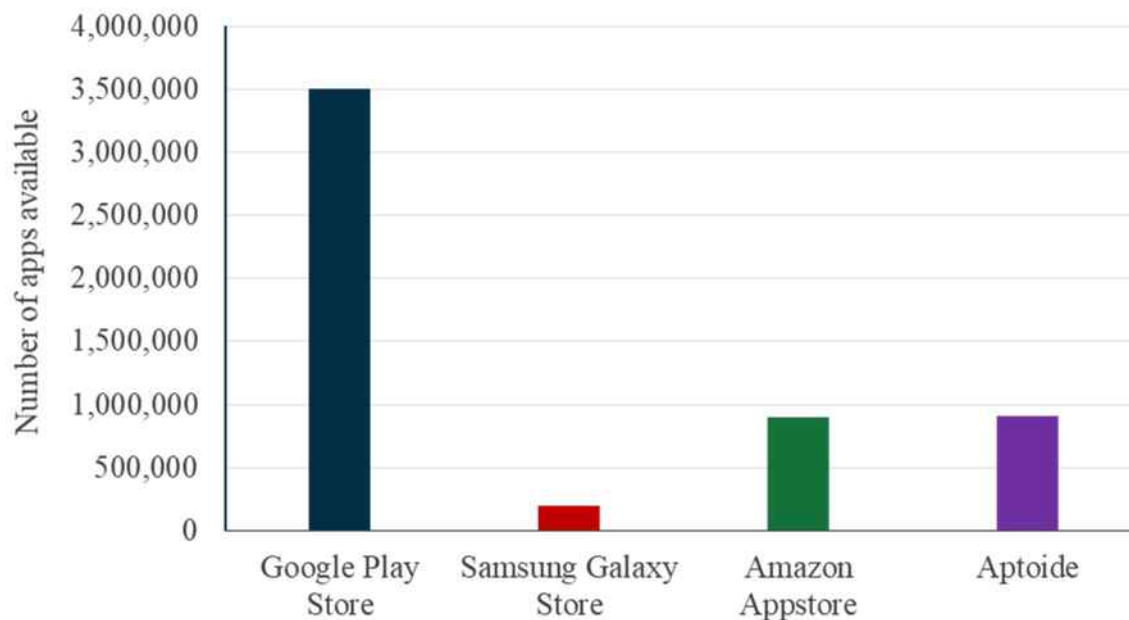
312. As depicted in Exhibit 45, the number of apps available on the Google Play Store vastly outnumbers the number of apps on any other Android app store, which provides further structural evidence of Google’s market power in Android App Distribution. At the end of 2017, the Google Play Store offered 3.5 million apps. By contrast, alternative Android app stores have vastly fewer number of apps available on their app stores. The Samsung Galaxy Store offered only 150,000-200,000 apps in March 2017, Amazon Appstore offered 700,00-900,000 apps in April 2017, and Aptoide offered 900,000 apps in June 2017.<sup>663</sup>

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<sup>662</sup> See Google, “Android OC Quarterly Review—Q4 2010,” October 12, 2010, GOOG-PLAY-001430401-442 at 412 (“We created the first app store for Android and it got critical mass quickly. The store now has value and partners want access to it because of the number of apps available.”). See also Google, “Play Global KOC Research,” GOOG-PLAY-009245422-443 at 429.

<sup>663</sup> EC Google Android Decision, ¶ 608.

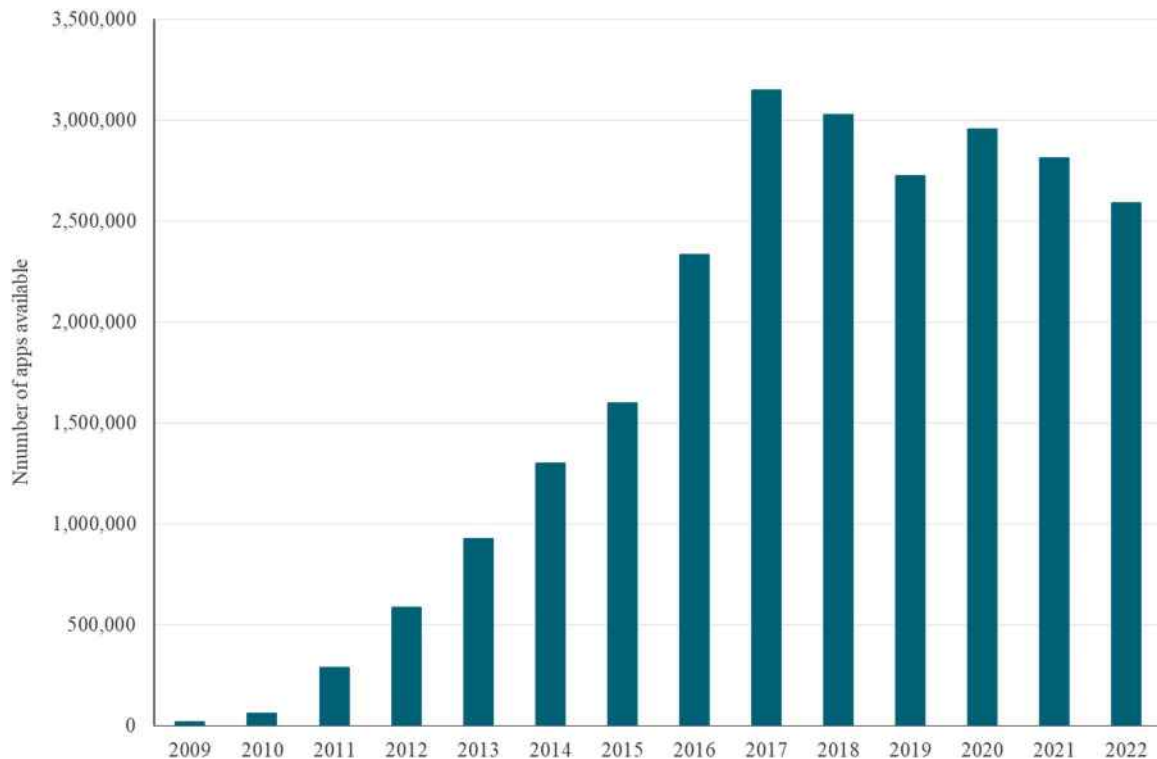
**Exhibit 45**  
**Number of Apps Available on Android App Stores, 2017**



*Source:* EC Google Android Decision, ¶ 608.

313. Moreover, there has been substantial growth in the number of apps available in the Google Play Store since Google's launch of Android Market, as depicted in Exhibit 46 below.

**Exhibit 46**  
**Number of Available Apps on the Google Play Store Worldwide, 2009 – 2022**



*Notes:*

1. Calculated as yearly averages based on the available monthly data from December 2009 to March 2022.
2. In summer 2018, Google removed a large amount of apps from its Google Play platform, mostly due to an updated version of the company's Developer Policy.

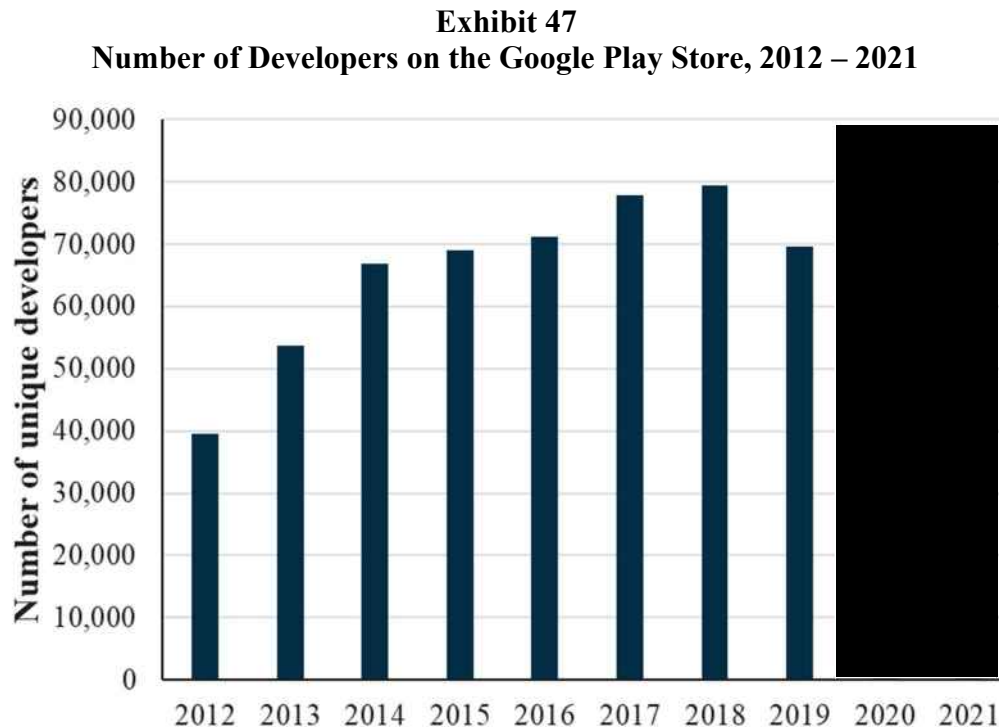
*Sources:*

1. Statista, "Number of available applications in the Google Play Store from December 2009 to March 2022," available at <https://www.statista.com/statistics/266210/number-of-available-applications-in-the-google-play-store/>.
2. Google, "Google Play Trust & Safety on Play," December 6, 2019, GOOG-PLAY-004775094-101, at 097.
3. Google, "Proposal to Remove Apps with Security Vulnerabilities," February 1, 2019, GOOG-PLAY-008737003-016.

314. Given that the Google Play Store provides many more apps and reaches a much larger number of users than any alternative Android app store, the Google Play Store is the single most important distribution method for developers who wish to distribute their Android apps. Data demonstrate that far more developers publish apps on the Play Store than on competing Android app stores. For example, in 2017, there were 724,000 developers active on the Google Play Store



compared to just 69,000 on the Amazon Appstore.<sup>664</sup> A Google employee wrote in an email that the number of developers on Play Console was “801k” as of September 28, 2018.<sup>665</sup> Data from Google shows the number of developers selling apps or in-app content (in each year) on the Google Play Store, as depicted in Exhibit 47 below.



*Source:* Google Monthly App Revenue Data.

315. As stated by Samsung, developers “target” the Google Play Store as a distribution channel because it is “the indisputable market leader for Android apps, in both number of apps and number of users.”<sup>666</sup> Google documents state the Google Play Store is commercially important to

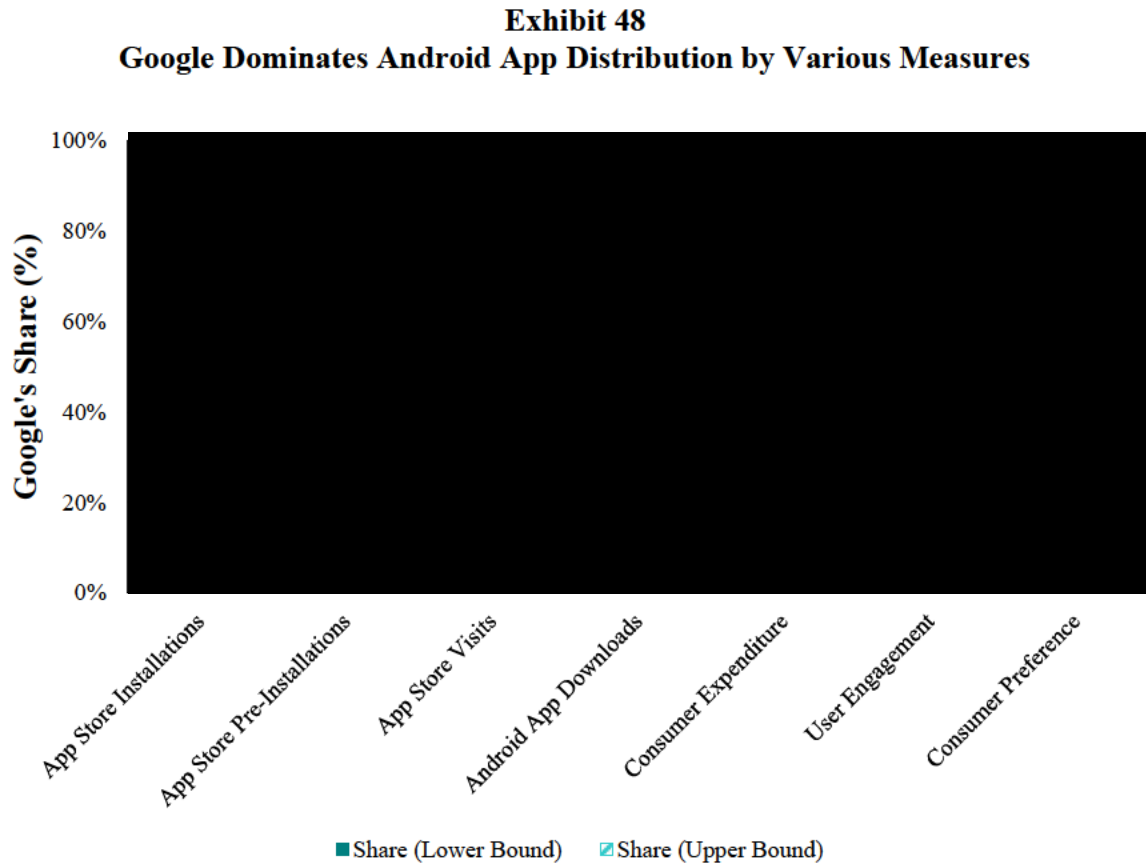
<sup>664</sup> Statista, “Total number of active mobile app developers in leading global app stores as of January 2017,” January 27, 2022, available at <https://www.statista.com/statistics/276437/developers-per-appstore/>.

<sup>665</sup> See, email from Ricky Singla, Google, to Pat Correa, Google, “Subject: Re: Urgent: # of developers,” October 4, 2018, GOOG-PLAY-000553664-666 at 664 (“Number of developers on Console depends on how you define that number. We track the number of developers who have at least one active app on the store. As on Sept 28th, this number was 801k as per our data.”).

<sup>666</sup> EC Google Android Decision, ¶ 611.

OEMs and developers because of Google Play’s “enormous reach” while being “installed on over two billion devices.”<sup>667</sup>

316. In summary, as shown in Exhibit 48 below, the evidence shows that Google has a high market share (on any metric) in the Android App Distribution Market.



*Sources: bolded bullet points at the beginning of paragraphs 303-308;310; and 311.*

317. However, as noted above, high shares alone are not sufficient to demonstrate monopoly power but must be reinforced with high barriers to entry. In the next section, I investigate whether there are high barriers to entry that protect these high shares.

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<sup>667</sup> See Google, “Android OC Quarterly Review—Q4 2010,” October 12, 2010, GOOG-PLAY-001430401-442 at 412 (“We created the first app store for Android and it got critical mass quickly. The store now has value and partners want access to it because of the number of apps available.”). See also Google, “Play Global KOC Research,” GOOG-PLAY-009245422-443 at 429.

b) Substantial barriers to entry/expansion protect Google's market power

318. As I explain above, high market shares combined with barriers to entry or expansion can be indicative of monopoly power. As explored in Sections III and V, the Android App Distribution Market exhibits significant indirect network effects. The Google Play Store has an installed base of millions of apps and hundreds of millions of users that have already used the store to download apps. It dwarfs all other Android app stores in these respects. This makes it essential for OEMs to offer the Google Play Store pre-installed to their customers, and for app developers who want to reach the largest number of Android users. This virtuous cycle creates substantial barriers both to entry by new potential Android app stores and to expansion by existing app stores. This is well documented in the economics literature. For example:

- Kouris & Kleer (2012), note: "Developers can only make profits if there are users who would download and buy their apps. Hence, indirect network effects are relatively high. That causes the participants of the app market to converge to one platform. Once there is a clear leader, other platforms' chances to get enough customers diminish."<sup>668</sup>
- Vogelsang (2010), notes that when an incumbent firm reaches dominance: "economy of scale effects would be at work so that the threat of market entry of a new competitor is minimized and the monopolistic rents can be exploited: the economies of scale of the platform technology lead to declining average costs and increasing persistence of users to stay on the platform. Therefore, potential competitors will be deterred from entering."<sup>669</sup>
- Kouris (2013), also outlines four conditions that make "winner-take-all" more likely: "It is costly to multi-home – at least for one market side; There are high indirect network effects – at least for the side with high multi-homing costs; Same-side effects are not

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<sup>668</sup> Kouris, Iana and Rob Kleer, "Business Models in Two-Sided Markets: An Assessment of Strategies for App Platforms," 2012, available at <https://aisel.aisnet.org/icmb2012/22/>.

<sup>669</sup> Vogelsang, Michael. "Dynamics of two-sided internet markets," *International Economics and Economic Policy*, Vol. 7, Iss. 1, May 2010), 129-145, at p. 138.

negative and strong, that is, the congestion effect is not too high; The goods are rather homogeneous and there is no demand for differentiation.”<sup>670</sup>

319. In addition, Google recognizes that:

- “An [A]ndroid app cannot ultimately survive as a product or business without being hosted on Play.”<sup>671</sup>
- “Play benefits from network effects. Users come to Play because we have by far the most compelling catalogue of apps ... Developers come to Play because that’s where the users are. Amazon will struggle to break those network effects.”<sup>672</sup>
- Consumers face “[s]ignificant hurdle[s] to switching to Amazon” that are “too high for most users.”<sup>673</sup>
- According to Google, Android’s large market share, coupled with the Google Play Store’s “preeminent” position “within Android,” leads developers to choose Android and the Google Play Store.<sup>674</sup>

320. Further, these network effects are fostered by Google’s conduct and further protect Google’s market power. Google recognizes that its MADAs with OEMs, as described in Section IV.B.2, are used to “[t]rade access to Google’s apps for placement.”<sup>675</sup>

321. The start-up costs of launching and expanding a competing Android app store are significant and likely to deter potential entrants. For example, Amazon states that it has “dedicated hundreds of employees and tens of millions of dollars each year over the course of several years to develop and commercialize its app store, including engineering, app store operations, business

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<sup>670</sup> Kouris, I. “App platforms as two-sided markets: analysis and modeling of application distribution platforms for mobile devices” (2013), at p66.

<sup>671</sup> Google, “Every Sticky Note,” GOOG-PLAY-004508011-013, at 012.

<sup>672</sup> Google, “Amazon competitor deep dive,” April 2017, GOOG-PLAY-000879194.R-224.R, at 207.R.

<sup>673</sup> Google, “Amazon competitor deep dive,” April 2017, GOOG-PLAY-000879194.R-224.R, at 204.R.

<sup>674</sup> See, Google, “Let’s talk about our business model,” GOOG-PLAY-000443763-798, at 768-769.

<sup>675</sup> See, Google, “Let’s talk about our business model,” GOOG-PLAY-000443763-798, at 768-769.

development, developer and consumer marketing, developer relations and support.”<sup>676</sup> For other firms, such as Sony, the costs that must be incurred to develop and maintain an app store that can compete with the Google Play Store have been “prohibitive.”<sup>677</sup> Since Google’s MADAs require OEMs to pre-install the Google Play Store in order to license its GMS suite of apps and APIs, new entrants would also need to invest in their own APIs to expand and fully compete with Google Play Store. Google recognizes that “Android does not include Google special sauce” without GMS, and most developers “don’t just want Android for Android; they want Android with GMS because [it’s] a much more compelling product.”<sup>678</sup> According to Aptoide, “[c]loning the entire GMS API stack (Maps, Messaging, Games, Billing...) implicates a[n] enormous [amount] of resources.”<sup>679</sup>

322. OEMs and MNOs also confirm Google’s market power and their dependency on the Google Play Store.<sup>680</sup> For example, Samsung contends it would “not be commercially feasible for an OEM to ship Android devices without Google Play pre-installed due to the variety and number of apps and contents available to users uniquely through the Google Play Store.”<sup>681</sup> Similarly, Orange, a French multinational telecommunications provider, explained that the Google Play Store is currently a “must-have” on Android smartphones, pre-installing it “has become de facto mandatory,”<sup>682</sup> and, since Google Play Store “has no real competitors,” it would be “very difficult to offer an app shop in competition with Google Play given (i) its link with Android OS and (ii) its current size.”<sup>683</sup> Jim Kolotorous, a Google employee, also noted that outside of China, he was

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<sup>676</sup> EC Google Android Decision, ¶ 628.

<sup>677</sup> EC Google Android Decision, ¶ 628.

<sup>678</sup> Email from Patrick Brady, Vice President of Engineering for Android’s Automotive Efforts at Google, to Wireless Biz, Google, “Subject: [Wirelessbiz] Re: Android Deployments and Partner Inquiries,” October 13, 2008, GOOG-PLAY4-000336290-293, at 291.

<sup>679</sup> EC Google Android Decision, ¶ 631.

<sup>680</sup> See email from John Yoo, Google, to Joshua O’Connor, Google, “Subject: Re: Value of Play to Google via MADA and app distribution,” April 4, 2019, GOOG-PLAY-002115870-871 at 870 (“OEMs want the Play store on their phone, and in return we are able to get other apps like Google search and chrome, Maps and Duo, Youtube and Drive (for instance) on the phone as a result”).

<sup>681</sup> EC Google Android Decision, ¶ 600.

<sup>682</sup> EC Google Android Decision, ¶ 600.

<sup>683</sup> EC Google Android Decision, ¶ 600.

unaware of any smartphone OEM that launched without installing a single Google app or service on their device.<sup>684</sup>

323. While customers could in theory access their apps via several alternative Android app stores or via sideloading, according to Deutsche Telekom there are commercialization challenges from “significant network effects as well as developer and customer lock-in,” which deter consumers from switching.<sup>685</sup> According to Opera, a Norwegian multinational technology company that offers both desktop and mobile browsers, Google “has established itself over the past few years as the default storefront for Android apps ... Significant customer education and marketing investment would therefore be required to change this user perception with respect to an alternative app store.”<sup>686</sup> By being “the de-facto standard Android app store,” Google has an inherent advantage in the Android App Distribution Market.<sup>687</sup>

324. In addition, and as discussed in Section VII.A.1, Google’s MADAs require OEMs to pre-load the Google Play Store on their Android smart mobile devices’ home screens, and Google often pays key OEMs up to [REDACTED] of its Google Play revenue (in addition to any [REDACTED] [REDACTED] if the OEMs agree not to pre-install a competing app store in a prominent position (e.g., on the home screen).<sup>688</sup> This would mean alternative “app stores struggle to gain traction because the pre-installed app store has the inbuilt advantage of being front and centre of the

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<sup>684</sup> Kolotouros (Google) Deposition, p. 110.

<sup>685</sup> EC Google Android Decision, ¶ 629.

<sup>686</sup> EC Google Android Decision, ¶¶ 629-630. Opera is a web browser that competes with Google Chrome and Microsoft Edge etc. See, <https://www.opera.com/about>.

<sup>687</sup> EC Google Android Decision, ¶ 637. This finding is supported in academic literature. See, e.g., Agarwal, R., & Gort, M., “First-mover advantage and the speed of competitive entry, 1887–1986,” *The Journal of Law and Economics*, Vol. 44, No. 1, 2001, pp. 161-177, at pp. 164-166 (“[A]dvertising can increase brand-name recognition of first movers and hence impede entry.”); Cubbin, J., “Advertising and the Theory of Entry Barriers,” *Economica*, Vol. 48, No. 191, 1981, pp. 289–298, at pp. 290-291 (“Thus we have a prima facie case for the proposition that advertising may contribute to an entry barrier effect without any fundamental asymmetries in cost or demand functions.”); Lieberman, M. B., & Montgomery, D. B., “First-Mover Advantages,” *Strategic Management Journal*, Vol. 9, 1988, pp. 41–58, at p. 46 (“Psychology literature suggest[s] that the first product introduced received disproportionate attention in the consumer’s mind. Late entrants must have a truly superior product, or else advertise more frequently (or more creatively) than the incumbent in order to be noticed by the consumer”).

<sup>688</sup> Google, “P&E Partnerships Ops Meeting Bi-Weekly,” February 24, 2021, GOOG-PLAY-003894142.R-177.R, at 172.R; Google, “Android Explainer - ACC, MADA, RSA, DCB,” February 2, 2018, GOOG-PLAY-001559464.R-496.R, at 478.R-479.R.

end user's experience when they first get their device.”<sup>689</sup> The ability to exclude rivals is a hallmark of market power.

325. Google also specifically targeted Samsung (see Section VII.A.1.b) because it posed the greatest threat to its monopoly, offering Samsung a revenue share of [REDACTED] on Google's revenue generated from the Galaxy Store, plus a \$50m/year payment [REDACTED]. These payments and incentives were designed to limit competition from Samsung's Galaxy Store and ensure Google Play Store's dominance as the primary Android App Distribution platform.<sup>690</sup>

326. For these reasons, coupled with the existence of indirect network effects, which prevent developers from considering “any other Android app store as substitutable for the Google Play Store based on the ability to reach end consumers,” it is “extremely difficult to establish a meaningful market segment share” for a potential new entrant.<sup>691</sup>

#### 4. *Google's Market Power in Android App Distribution Faces Limited Competitive Constraints from Alternative App Distribution Systems*

327. As discussed in Section V.C.4 above, the Apple App Store does not provide a sufficient competitive constraint on the Google Play Store or other Android app distributors to be considered in the same relevant market. Because they operate in different markets, the Apple App Store does not constrain the Google Play Store. Further, non-Android app stores such as the Apple App Store do not exert competitive pressure on the Android App Distribution Market because (i) they do not function on Android smart mobile devices and (ii) Apple does not allow its mobile OS to be installed on non-Apple devices. As discussed in Section V.C.4, users show low propensity to switch to alternative mobile OSs due to the high costs of switching to a mobile device running an alternative OS. Moreover, developers view Android and non-Android app distribution channels as complements, rather than substitutes, and tend to multi-home by publishing their apps on both the

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<sup>689</sup> EC Google Android Decision, ¶ 636.

<sup>690</sup> See Section VII.A.1. *See also* Google, “Google-Samsung Store Agreement Term Sheet,” June 20, 2019, GOOG-PLAY4-004259430, at 432.

<sup>691</sup> This is the so-called chicken and egg problem: in order to attract developers, an app store should have a large base of users, who are willing to join only if a large base of developers write for that app store. *See* Jullien, Pavan & Rysman (2022), at pp. 17-18. *See also* Caillaud & Jullien (2003); EC Google Android Decision, ¶ 638.



Apple App Store and Google Play Store. Thus, the threat of switching to an Apple iOS device to access the Apple App Store will not constrain Google's behavior. I therefore find the relevant antitrust market to be a market for Android App Distribution, as explained above.

328. As described in Section V.C.4, most purchasers of smart mobile devices are already locked into their initial mobile ecosystem, as evidence suggests that a relatively small proportion of mobile device purchasers are buying their first smart mobile device. For example, worldwide smartphone penetration has steadily increased from just under 50% in 2016 to approximately 78% in 2020,<sup>692</sup> with rates even higher in developed nations. For example, a 2021 survey found that about 91% of households in the U.K. had smartphones.<sup>693</sup>

329. Given this very high rate of smart mobile device ownership, the significant constraint on Google's behavior will therefore need to come from existing mobile users (particularly as Google, Apple and/or the OEMs cannot discriminate between new and existing OS users). However, as described in Section V.C.4, these users are locked into the mobile ecosystem previously chosen, and, thus, switching costs and other barriers to switching smart mobile devices will drive Google's behavior in relation to the Google Play Store. As discussed in detail in Section V.C.4, mobile device users face significant costs when switching from Android to iOS. These include compatibility costs, transaction costs, the time to learn a new OS, uncertainty costs, among others. The existence of high switching costs naturally locks consumers into Google's Android ecosystem at the initial purchase of Android smart mobile devices, and as a result, the rate of switching between Android and iOS is quite low (see the evidence presented in Section V.C.4).

330. Further, most mobile device users single-home on either Android or iOS, with few users owning two or more devices covering both OSs. For example, survey evidence shows that 80% of users only have one smartphone, and even when users purchase another smartphone, it tends

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<sup>692</sup> See Statista, "Global smartphone penetration rate as share of population from 2016 to 2020," August 11, 2022, available at <https://www.statista.com/statistics/203734/global-smartphone-penetration-per-capita-since-2005/>.

<sup>693</sup> See Ofcom, "Online Nation, 2021 Report," Figure 1.3, available at [https://www.ofcom.org.uk/\\_\\_data/assets/pdf\\_file/0013/220414/online-nation-2021-report.pdf](https://www.ofcom.org.uk/__data/assets/pdf_file/0013/220414/online-nation-2021-report.pdf).

to have the same OS.<sup>694</sup> As noted in Google’s documents, for iPhone users who own tablets, 72% own iPads whereas 30% own Samsung tablets (a tiny percentage own both); for Android users who own tablets, at least 60% own a Samsung tablet with the iPad ownership rate at 31% for Pixel owners and 33% for Samsung owners.<sup>695</sup> The 2022 CMA Consumer Survey confirms the modest cross-ownership rate, showing that among Apple iPhone users, 63% owned an iPad, while only 7% owned an Android tablet.<sup>696</sup> For Android users, 36% also owned an Android tablet, while only 18% owned an iPad.<sup>697</sup> Similarly, evidence from app developers suggests only a small proportion of mobile device users access their apps from more than one OS.<sup>698</sup> That is consistent with evidence described earlier in the report (See Section V.C.4) that consumers do not switch, in part, because they are locked in to the Android or iPhone ecosystems and the hardware and software that is exclusive to the ecosystem they use. As set out in Section V.C.4, the Presser Survey found that 62% of respondents would worry that they might lose access to photos, phonebooks or other things they have on their devices, while between 71% and 78% said that switching to iPhone would take “some” effort or “a lot” of effort.<sup>699</sup>

331. Moreover, Android and Apple’s iOS are two highly differentiated mobile ecosystems with distinct hardware and software, and smart mobile device pricing aimed at different target markets.<sup>700</sup> For example, in terms of software, Android smart mobile devices are pre-installed with the GMS suite of apps, including Google Search, Google Chrome, Google Play Store, etc., but

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<sup>694</sup> See CMA Final Report on Mobile Ecosystems, ¶3.39 and footnote 85.

<sup>695</sup> Google, “Consumption tablets,” May 2019, GOOG-PLAY-000436340.R-406.R. at 383.R.

<sup>696</sup> See, CMA Customer Survey, Figure 21.

<sup>697</sup> See, CMA Customer Survey, Figure 21.

<sup>698</sup> See, CMA Final Report on Mobile Ecosystems, ¶3.40.

<sup>699</sup> Presser Report, p. 8.

<sup>700</sup> See e.g., Cipriani, Jason, “Is there an alternative to Apple's ecosystem? Yes, but you'll have to Google it,” *Zdnet*, May 1, 2019, available at <https://www.zdnet.com/article/alternatives-to-apples-ecosystem-yes-there-is-a-way-out/>.

Android can also provide different software experiences (*i.e.*, an Android ‘skin’<sup>701</sup>) depending on which OEM is selling the Android mobile device.<sup>702</sup> By contrast, iOS smart mobile devices are equipped with Apple’s proprietary native apps such as iMessage, Facetime, and Safari, and Apple only offers a single concurrent version of iOS with a lack of customization (See Section V.C.4), whereas Android offers more choice in terms of software experience. In terms of hardware, Apple iPhones use Apple’s own propriety processor (*e.g.*, the iPhone 13 series uses the A15 Bionic<sup>703</sup>) and, similar to software, offer relatively limited customizations (*e.g.*, size etc.), while Android smart mobile devices offer a plethora of different hardware and software combinations across many different OEMs.<sup>704</sup> These differences in hardware and software experiences and customization often attract different types of customers.<sup>705</sup>

332. Further, mobile device pricing for Android and iOS smart mobile devices are generally targeted at different segments of the price spectrum. To examine this, I have analyzed IDC data on the prices and quantity sold of Android and iOS smartphones (*i.e.*, excluding tablets) from 2017 until 2021 (worldwide excluding China). This analysis, depicted in Exhibit 49 below, demonstrates that Android focuses heavily on the lower priced smartphone segment, with more than 80% of Android smartphones sold for under \$300, whereas Apple iPhone sales are concentrated above \$600, with more than 50% of iPhone sales between \$600 and \$1,000. This is despite Apple’s attempts to move into the mid-tier price brackets with its iPhone SE in 2016 (priced as low as

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<sup>701</sup> “Android skins are software tweaks that live on top of stock Android. They often look very different and offer features that other skins don’t. In other words, underneath all the additional design and functionality tweaks, the core version of Android is on all Android devices. To add some brand identity though, some manufacturers craft an experience that’s truly unique to their lines of phones. Others leave well enough alone and barely touch how Android functions.” See Brown, C. Scott, “The many flavors of Android: A look at the major Android skins,” April 2, 2022, available at <https://www.androidauthority.com/android-skins-945375/>.

<sup>702</sup> See Brown, C. Scott, “The many flavors of Android: A look at the major Android skins,” April 2, 2022, available at <https://www.androidauthority.com/android-skins-945375/>.

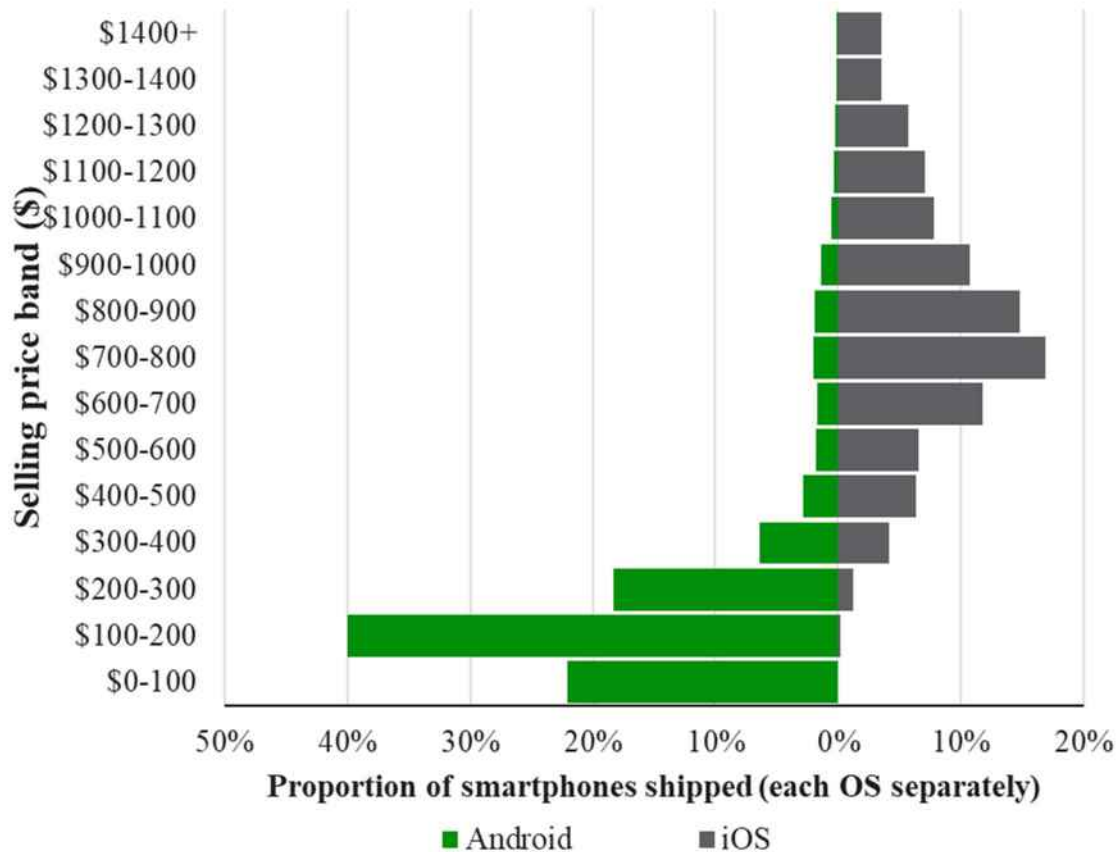
<sup>703</sup> See, Nanoreview.Net, “Apple A15 Bionic,” available at <https://nanoreview.net/en/soc/apple-a15-bionic>.

<sup>704</sup> See *e.g.*, Peters, Aaron, “How Android Differs Depending on the Hardware Manufacturer,” November 9, 2017, available at <https://www.makeuseof.com/tag/android-differs-hardware-manufacturer/>. See also Nield, David, “4 ways to know if iOS or Android is better for you,” March 16, 2022, available at <https://www.popsoci.com/differences-between-android-and-ios/>; see also Diffen, “Android vs. iOS,” [https://www.diffen.com/difference/Android\\_vs\\_iOS#Device\\_Selection](https://www.diffen.com/difference/Android_vs_iOS#Device_Selection).

<sup>705</sup> See, Nield, David, “4 ways to know if iOS or Android is better for you,” March 16, 2022, available at <https://www.popsoci.com/differences-between-android-and-ios/>.

\$399<sup>706</sup>), iPhone SE (2<sup>nd</sup> gen) in 2020 (also priced as low as \$399<sup>707</sup>) and a further iteration SE in 2022 (price as low as \$429<sup>708</sup>).

**Exhibit 49**  
**Proportion of Smartphones Sold by Price Bracket and OS,**  
**Worldwide (excluding China), 2017 – 2021**



*Note:* Data exclude sales of feature phones and tablets.

*Source:* IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

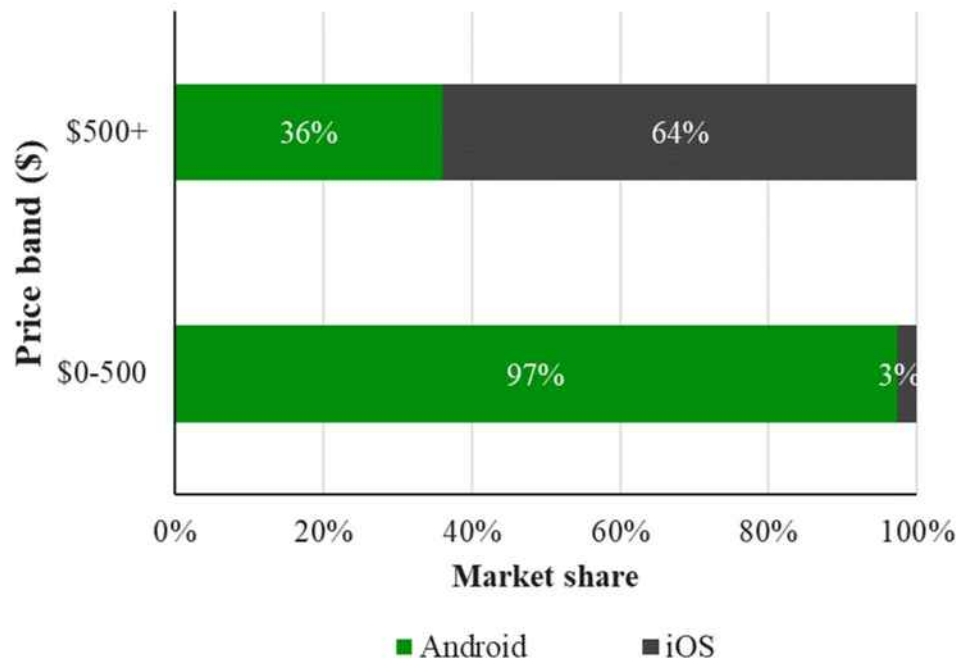
<sup>706</sup> See Espósito, Filipe, “Six years later, first-gen iPhone SE runs the latest version of iOS – and it’s still good,” available at <https://9to5mac.com/2022/03/22/six-years-later-first-gen-iphone-se-runs-the-latest-version-of-ios-and-its-still-good/>.

<sup>707</sup> See Bohn, Dieter, “Apple announces the new \$399 iPhone SE for 2020,” April 15, 2020, available at <https://www.theverge.com/2020/4/15/21221918/iphone-se-announcement-apple-price-specs-release-date-features>.

<sup>708</sup> See MacRumours, “iPhone SE,” August 30, 2022, available at <https://www.macrumors.com/roundup/iphone-se/>.

333. Unsurprisingly, considering the sale of all smartphones, Android's share of smartphones under \$500 between 2017 and 2021 is 97%, with iPhone just 3%. Of smartphones sold over \$500, iPhone instead is dominant with a 64% share (compared with Android's 36% share), as depicted in Exhibit 50 below.

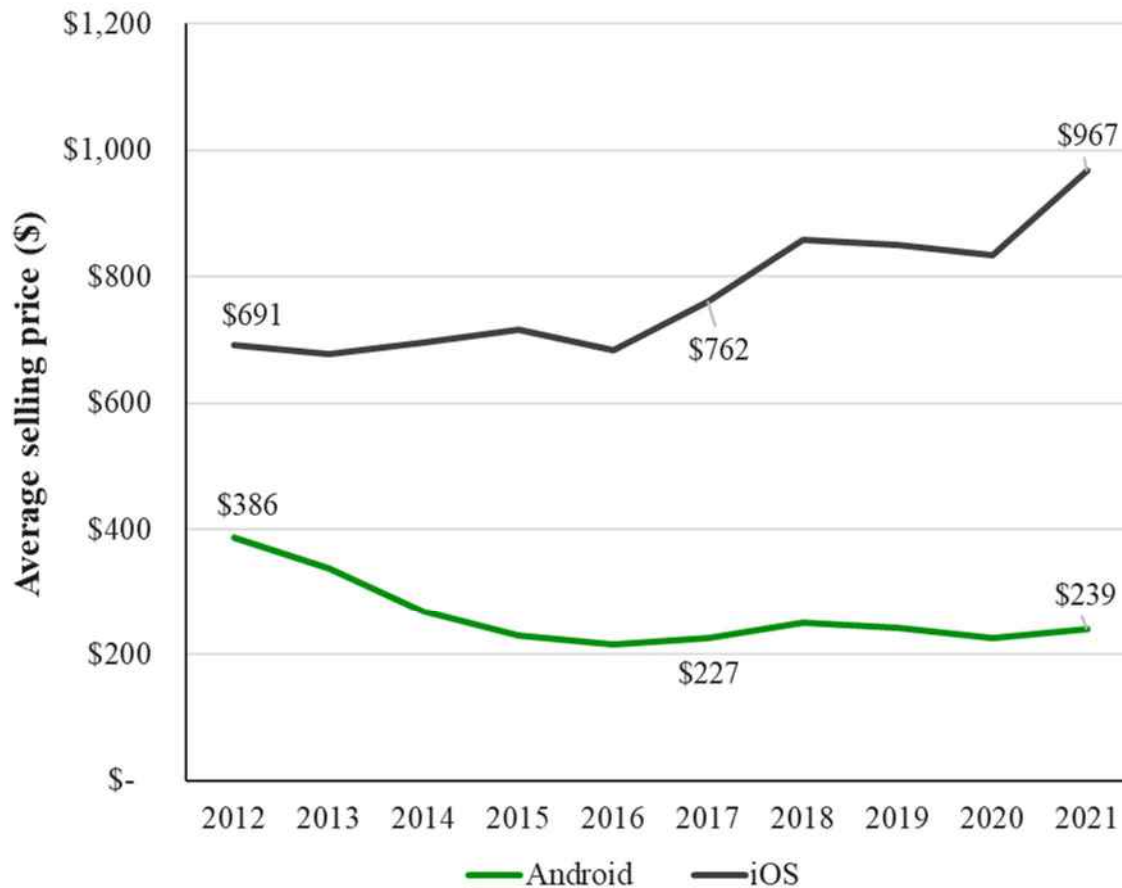
**Exhibit 50**  
**Android Dominates Lower Priced Smartphones, 2017 – 2021**



*Source:* IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

334. Finally, I analyze the average prices of Android and iPhones over the period 2012 to 2021. As depicted in Exhibit 51 below, the average Android smartphone has been consistently under \$400, falling from \$386 in 2012 to just \$227 in 2017 (and has stayed around that level through to 2021). In contrast, the average price of iPhones sold was \$691 in 2012 and it has been steadily increasing to \$967 in 2021.

**Exhibit 51**  
**Average Price of Smartphones Sold by OS, Worldwide (excluding China), 2012 – 2021**



Source: IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

335. Google does not currently charge a license fee for Android and has actively encouraged OEMs to use Android on their smart mobile devices (see Section IV.B), which, Google notes, “has helped increase the number of smartphone owners by enabling [manufacturers] to develop quality smartphones and tablets at low cost.”<sup>709</sup> This business model helps explain why most low-priced smart mobile devices are Android devices.

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<sup>709</sup> See, CMA Final Report on Mobile Ecosystems, ¶3.30.

336. I understand that Google is sometimes concerned about the Apple ecosystem. However, that does not imply that the Apple App Store is in the relevant market or constrains Google's market power. As exemplified by the well-known cellophane fallacy (see Section V.A), even a very strong monopolist may raise price until it faces significant substitution from outside the relevant antitrust market, and, thus, every firm is constrained by some competition no matter its level of monopoly power. Antitrust focuses on raising price above the *competitive price*, not the observed price.

337. Furthermore, antitrust measures of competitive constraints (*e.g.*, in a formal market definition assessment as set out in Section V.A), consider small price increases, typically 5% or 10% (indeed, "small" is the first word in SSNIP). Thus, to represent true competitive concerns, the types of concerns exhibited in Google's documents would need to represent small changes in the way consumers or developers perceive iOS relative to Android that would be equivalent to a price change smaller than a SSNIP. However, if, for example, Google was concerned with large developers (such as Netflix) threatening to produce for iOS and not Android, arguably this would represent much bigger changes to the value of the Android system. Indeed, as described in Section V.C.4, I have earlier documented significant consumer stickiness and switching costs, so an app that can affect OS adoption through its decisions represents what consumers would perceive to be large changes in value.

338. However, even if there was substantial competition between iOS and Android, that would not be sufficient to constrain Google's market power in the Android App Distribution Market. For OS competition to be a constraint on app distribution, it must be that outcomes in the Android App Distribution Market have a significant effect on mobile OS choices. In contrast, to the extent that app distribution is *not* a primary factor that drives mobile OS/device choices, mobile OS competition does *not* constrain the Android App Distribution Market. Moreover, survey evidence indicates that app distribution is not among the primary factors driving consumers' mobile OS decision (see Section V.C.4), and, thus, mobile OS competition does not constrain Google's market power in the Android App Distribution Market.

339. App stores on PCs or gaming consoles do not exert competitive pressure on the Android App Distribution Market, due to the different uses of apps on smart mobile devices



compared to apps on PCs or gaming consoles. As discussed in Section V.C.4, apps that are designed with the unique hardware of smart mobile devices in mind often do not function on PCs or gaming consoles, and consumers typically use these devices for different purposes.

5. *Summary on Google's Market Power in the Android App Distribution Market*

340. In summary, I conclude that Google, with the Google Play Store, has monopoly power in the Android App Distribution Market. Google had high and durable worldwide (excluding China) market shares based on several metrics including app store installations, app store pre-installations, app downloads, consumer expenditure on apps, and user engagement (including visits and time spent on app stores). The Android App Distribution Market also exhibits significant indirect network effects and significant costs of starting and expanding a competing app store, which together constitute a substantial barrier to entry and expansion. Google has, as a result of these factors and of its own anti-competitive conduct, sustained supracompetitive commissions in the Google Play Store, resulting in sustained high margins from the Google Play Store, which have not been eroded by competition from alternative Android or non-Android app stores (or sideloading). This evidence is consistent with Google having monopoly power in the Android App Distribution Market.

341. Finally, I note that this conclusion is consistent with the Commission Decision on Google Android, which found that “Google holds a dominant position in the worldwide market (excluding China) for Android app stores since 2011.”<sup>710</sup> It is also consistent with the CMA Mobile Ecosystems Final Report, which found that Google has “substantial and entrenched market power in native app distribution, with limited constraints on [the Google Play Store] ... On Android, this is driven by a limited constraint from alternative app stores (which have [less than 10]% of native app downloads), limited sideloading and web app usage and very few opportunities for preinstallation.”<sup>711</sup>

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<sup>710</sup> EC Google Android Decision, ¶ 590.

<sup>711</sup> CMA Final Report on Mobile Ecosystems, ¶ 4.184.

**B. Google’s Market Share is Consistent with a Very High Degree of Market Power Even if the Relevant Market Includes the Apple App Store**

342. Counsel has also asked me to consider, as a hypothetical matter, whether including the Apple App Store in the relevant market leads to market shares that would change my opinion that Google has a very high degree of market power. For the reasons explained in Section VV and Section VI.A.4 above, I conclude that it would not.

343. Worldwide, Android shipped 81.1% of phones in 2014, rising to 86.2% in 2022, while Apple’s share diminished from 15.6% to 13.8% during the same period.<sup>712</sup> Together, Google and Apple far surpass the next largest competitor and the hypothetical market that I have been asked to consider could be characterized as a duopoly.

344. Duopolists can wield a very high degree of market power. Thus, I conclude that even if we consider a hypothetical market including iOS, market shares are still consistent with a market in which Google wields a very high degree of market power. Further, Google’s power in this hypothetical market would be bolstered by the same factors that led me to conclude that the relevant market should not include iOS in the first place, namely, ecosystem lock-in, low switching, and low user multi-homing, driven by the highly differentiated nature of Android/iOS and different market focus of each. Thus, even if we consider a hypothetical market including iOS, the combination of extreme concentration of the market in two dominant firms, combined with high switching costs are consistent with the Google Play Store possessing a very high degree of market power.

**C. Google has Monopoly Power in the Android In-App Billing Services Market**

345. I next consider whether Google has monopoly power in the Android In-App Billing Services Market, which, as discussed in Section V.D, consists of Google Play Billing, third-party in-app billing service providers (such as PayPal, Stripe, Braintree, WorldPay, and Adyen),

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<sup>712</sup> Statista, “Share of global smartphone shipments by operating system from 2014 to 2023,” July 27, 2022, available at <https://www.statista.com/statistics/272307/market-share-forecast-for-smartphone-operating-systems/>.

companies that offer more bespoke solutions (such as Xsolla and Zuora), and developers' own billing solutions.<sup>713</sup>

346. In assessing whether Google has monopoly power in the Android In-App Billing Services Market, I consider direct evidence and whether the commission charged by Google is set above the competitive level, structural evidence and barriers to entry / expansion that could limit the ability of potential entrants or existing rivals to constrain Google. Based on my assessment described below, I find Google has monopoly power in the Android In-App Billing Services Market.

347. My conclusion that Google has monopoly power in the In-App Billing Services Market is not relevant to my assessment of whether Google has leveraged its market power in Android App Distribution to require developers to use Google Play Billing.

*1. Google Profitably Imposes a Supracompetitive Commission*

348. As explained in Section VI.B above, Google charges developers a 30% commission for sales of apps and in-app purchases via Google Play Billing. Since the beginning of Google Play Billing, Google has been sustainably charging a commission for in-app transactions well above the marginal cost of processing in-app transactions, with Google admitting that “Play is profitable above a 3% effective rev share.”<sup>714</sup> A 2009 Google document titled “Apps Marketplace Monetization Ideas,” confirmed that “30% is an arbitrary fee” that exceeds “the transaction cost to

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<sup>713</sup> For example, in its ordinary course document titled “Play Subscription Billing Compe[titor],” Google compared billing features such as “[b]illing [f]requency [s]upported,” “[f]ree [t]rials” and “[r]efunds” of its Play Billing to other in-app billing service providers, including Amazon, Zuora, Stripe, Braintree, Adyen, etc. *See* Google, “Play Subscription Billing Compe[titor],” GOOG-PLAY-000308762.

<sup>714</sup> *See* email from Kevin Du, Google, “Subject: Re: [android-advocates] Re: [android-vendingmachine] Re: Change in default revenue share,” July 17, 2009, GOOG-PLAY-001677481-484 at 483 (“My personal opinion is that this actually sends a better message to the developers - you always get 70% no matter what is the deal Google has with the carrier.”). *See also* Google, “Monthly Finance Meeting,” August 2020, GOOG-PLAY-000345879.R-898.R, at 886.R.

GOOG (2%).”<sup>715</sup> Another Google document recognized that the 30% commission is untenable for many developers.<sup>716</sup>

349. As discussed in Section IV.B.7, Google has recently implemented tiered commissions for certain types of transactions, including 15% for subscription service renewals.<sup>717</sup> A 2020 Google document titled “Project Runway: Proposal for changes to Play business models” estimated that this change to a “30/15 after year 1 will cost [REDACTED] and “GPB discount for small developers will cost [REDACTED].”<sup>718</sup> Based on the information described above, Google’s reduced commissions of 15% are still profitable, given that they are higher than its [REDACTED] costs.<sup>719</sup> , and, in fact, Google could have earned profits at even lower commissions, which it documents in the “Project Runway” document noted above:<sup>720</sup>

“If [the] government mandated requirement to make play billing optional, we respond with aggressive store changes and perhaps lower service fee,” “[m]aybe [REDACTED] would be more appropriate.”

350. Moreover, in select instances, Google has significantly reduced its commission.<sup>721</sup> For example:

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<sup>715</sup> See Google, “Apps Marketplace Monetization Ideas,” January 26, 2009, GOOG-PLAY-004630018.R-032.R, at 024.R.

<sup>716</sup> Google, “Play Payments Policy,” June 17, 2020, GOOG-PLAY-001018461.R-468.R at 462.R (“Industry structure/biz model constraints makes [the] 30% service fee untenable.”). Google, “Play Global KOF Research,” GOOG-PLAY-009245422-443 at 440 (“Many developers have lean checkbooks — few operate at a 30% profit margin. How can app developers expect to profit off of their creativity and hard work if Google Play is taking 30% of their business?”).

<sup>717</sup> See Google, “Google Play service fees,” Google, available at <https://support.google.com/googleplay/android-developer/answer/112622>.

<sup>718</sup> See Google, “Project Runway: Proposal for changes to Play business models,” November 16, 2020, GOOG-PLAY-006990552-571, at 553.

<sup>719</sup> See Google, “Apps Marketplace Monetization Ideas,” January 26, 2009, GOOG-PLAY-004630018.R-032.R, at 024.R; see also Google, “Project Runway: Proposal for changes to Play business models,” November 16, 2020, GOOG-PLAY-006990552-571, at 555 (suggesting a [REDACTED] fee as opposed to a 30% fee).

<sup>720</sup> See Google, “Project Runway: Proposal for changes to Play business models,” November 16, 2020, GOOG-PLAY-006990552-571, at 555.

<sup>721</sup> Google decided to “[p]rovide lower service fee in return for new platform adoption, policy compliance, and high-quality apps.” Google, “Play Payments Policy,” June 17, 2020, GOOG-PLAY-001018461.R-468.R at 462.R.

- Around 2015, Google launched “a behind the scenes effort called the Living Room Accelerator Program (LRAP),” which offered 15% commission [REDACTED] to incentivize them to adopt Google Play Billing.<sup>722</sup>
- In 2017, Google also offered [REDACTED] a [REDACTED] revenue share, and in 2020, Google even planned to lower the revenue share to [REDACTED].<sup>723</sup> Ultimately, under the Choice in Billing program, Google and [REDACTED] agreed [REDACTED].<sup>724</sup>
- Google also considered offering [REDACTED] a commission as [REDACTED] has also, more recently, threatened to build its own billing system.<sup>725</sup>
- Since 2020, it has offered a [REDACTED] commission to certain developers of [REDACTED] requiring certain steps for the developers to integrate their apps into the Android

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<sup>722</sup> See email from Sameer Samat, Vice President of Product Management at Google, “Subject: Re: Pls Read: App store email,” June 8, 2016, GOOG-PLAY-000081809-811, at 811; and Google, “Living Room Accelerator Program,” April 5, 2016, GOOG-PLAY-000578299.R-309.R. at 301.R.-305.R. See also, Samat (Google) Deposition, pp. 337-338 (“Q. And in terms of the Living Room Accelerator Program, a qualifying developer in the LRAP program would be charged a 15 percent service fee for in-app purchases on mobile – on mobile devices? A. If the developer was qualified for and enrolled in the Living Room Accelerator Program and met the requirements, [REDACTED]

[REDACTED] and that would have been 15 percent to my recollection.”), and pp. 345, 469-471, and 483-485.

<sup>723</sup> See Google, “Play Policy Feedback,” October 30 – November 8, 2017, GOOG-PLAY-000442329-350, at 343 (“Offered [REDACTED] rev share per ADAP++. They were happy that we came down on the rev share but didn’t confirm if this is going to work for them.”). See also Google, “Monthly Finance Meeting,” August 2020, GOOG-PLAY-000345879.R-898.R, at 885.R (“BD team pitched [REDACTED] a [REDACTED] rev share of [REDACTED].

<sup>724</sup> [REDACTED] - [REDACTED] GOOG-PLAY-011250116-166, at 120 (“[REDACTED] n.

<sup>725</sup> See Google, “Play Policy Feedback,” September 28 – October 3, 2017, GOOG-PLAY-000442329-350, at 345-346 (“Option 1: Activate GPB globally at [REDACTED] (LRAP++), or Option 2: Activate GPB [REDACTED] “Appreciate the reduced rev share, but claim that [REDACTED] would not be net positive for them.” “Temporary (or permanent?) rev share [REDACTED] and Google, “Play Payments Policy,” October 31, 2019, GOOG-PLAY-001088669.R-687.R. at 673.R (Match, [REDACTED], among others, “[n]ever [i]ntegrated” Google Play Billing.). See also email from George Audi, Google, “Subject: Re: [REDACTED] GOOG-PLAY-000259276-279, at 277 ([REDACTED], unlike most developers, views [REDACTED] This is not a competence that the rest of the developer ecosystem has or is willing to build.”).

ecosystem.<sup>726</sup> According to Google, the program was “pretty successful in getting [Google’s] partners to adopt [Google’s] billing.”<sup>727</sup> Google claims approximately [REDACTED] developers have taken advantage of that offer.<sup>728</sup>

- Further, in 2021, Google offered a 15% commission for developers who generate revenue through subscription services, such as e-books and streaming music or video, to encourage developers to build their apps for Android (see Exhibit 16).<sup>729</sup>

351. Discounted commissions are only available to certain developers, suggesting most developers do not have bargaining power and must accept the 30% commission.<sup>730</sup> Analysis of Google’s transaction data indicates that most developers pay a 30% commission.<sup>731</sup> Google also demonstrated in 2017 that it was actively enforcing Google Play Billing on the remaining developers who had not integrated (or had only done a “partial launch” of) Google Play Billing functionality into their app (*e.g.*, FranceTV, eHarmony, Navitime, and Melon).<sup>732</sup> The enforcement

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<sup>726</sup> See email from Sameer Samat, Vice President of Product Management at Google, “Subject: Re: Pls Read: App store email,” June 8, 2016, GOOG-PLAY-000081809-811, at 811; and Google, “LRAP++: Program Details and Outreach Process,” July 20, 2020, GOOG-PLAY-003330554-558, at 554-556.

<sup>727</sup> See email from Sameer Samat, Vice President of Product Management at Google, “Subject: Re: Pls Read: App store email,” June 8, 2016, GOOG-PLAY-000081787-789, at 788.

<sup>728</sup> See Google’s Answers and Objections to Developer Plaintiffs’ First Set of Interrogatories, Response to Interrogatory No. 3.

<sup>729</sup> Google Transaction Data indicated the average service fee for subscriptions [REDACTED] in 2021, *see* Exhibit 67. *See also*, Perez, Sarah, “Google lowers Play Store fees to 15% on subscription apps, as low as 10% for media apps,” *Tech Crunch*, October 21, 2021, available at <https://techcrunch.com/2021/10/21/google-lowers-play-store-fees-to-15-on-subscriptions-apps-as-low-as-10-for-media-apps>.

<sup>730</sup> For example, Google has secured about 100 deals with developers since the launch of LRAP. *See*, Google, “Accelerator Programs 2.0 aka Project Secret Carrots,” GOOG-PLAY-007329063-073, at 068.

<sup>731</sup> See Exhibit 36.

<sup>732</sup> *See*, Google, “Play Policy Feedback,” October 30 – November 8, 2017, GOOG-PLAY-000442329-350, at 329-338. Google, “Play Billing Policy,” August, 2019, GOOG-PLAY-003334312-347 at 316. Email from Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, to Sameer Samat, Vice President of Product Management at Google, “Subject: Re: Netflix,” August 1, 2017, GOOG-PLAY-009911010-012 at 011. Google also announced that the enforcement of its own billing starts in April 2018, noting that “[w]e want to link use of Play IAB with distribution by Play” and “[y]ou don’t get to use our IAB if you didn’t use our distribution.” “IAB” was confirmed as Google Play Billing in the deposition of Paul Feng. *See also* Google, “PPS: Blocking IAP from sideloaded apps,” September 2017,

for billing compliance applies to developers globally as Google considers this “[w]ill be a global effort.”<sup>733</sup>

352. Moreover, my own analysis of Google’s transaction data reflects that the average commission charged across all in-app purchases for the period since Google implemented its commission changes to certain types of transactions or developers (*i.e.*, [REDACTED] of transactions in 2020) is [REDACTED] for the period from January 2015 to July 2021.<sup>734</sup>

## 2. *Structural Evidence Demonstrates Google’s Monopoly Power*

### a) Google has a very high share of the Android In-App Billing Services Market

353. As discussed above, high market shares can be an indicator of market power. As noted in Section V.D.1, as of 2020, 97% of app developers who sold digital goods via the Google Play Store used Google Play Billing.<sup>735</sup> In fact, the proportion of developers that have integrated Google Play Billing could be even higher; an internal Google senior management meeting memo noted that 99% of developers were not using Google Play Billing alternatives (thereby implying 99% were exclusively using Google Play Billing).<sup>736</sup> Given the Google Play Store’s dominance in the Android App Distribution Market and Google Play Billing’s very high usage among developers

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GOOG-PLAY-002405918.R-947.R. at 919.R.-921.R. Feng (Google) Deposition, pp. 287-288 (“Q. The title of this is ‘Blocking IAP from sideloaded apps.’ Do you see that? A. Yes. Q. And IAP, is that correct that I’m referring that related to Google Play Billing? A. That’s correct. Q. And if you could please turn to the page marked 5921.R on the bottom right. A. Yes, okay. Q. Do you see the goal of this presentation was to, quote, ‘Prevent Play IAB transactions in apps not installed via Play’? Do you see that? A. Yes.”). Other prestigious developers such as Epic was also enforced by Google. *See also* email from googleplay-developer-support@google.com to Haseeb Malik, Mobile Publishing Director at Epic, January 9, 2020, EPIC\_GOOGLE\_01975130-131 at 131 (“Specifically, your app continues to violate Payments policy, which generally prohibits games published on Google Play from providing a payment method other than Google Play Billing to purchase in-app virtual currency or in-app digital downloads.”).

<sup>733</sup> Google, “Billing Policy Compliance,” January 2021, GOOG-PLAY-006817773.R-890.R, at 777.R.

<sup>734</sup> Google Transaction Data; *See also* Rysman Workpapers.

<sup>735</sup> *See* Samat, Sameer, “Listening to Developer Feedback to Improve Google Play,” *Android Developers Blog*, September 28, 2020, available at <https://android-developers.googleblog.com/2020/09/listening-to-developer-feedback-to.html>.

<sup>736</sup> The quote was “99% of devs not on non-GPB.” *See* Google, Untitled, July 25, 2019, GOOG-PLAY-007346993-049, at 002.



who distribute apps on the Play Store, Google is likely to have a very high proportion of the total revenues from in-app transactions in the Android In-App Billing Services Market.

354. To estimate Google Play Billing's share of the Android In-App Billing Services Market, I have reviewed Google's financial data on its revenue from Google Play Billing and relevant information from third-party app stores where available.

- I start with Google's global revenues from the Play Store totaling [REDACTED] million in 2019.<sup>737</sup>
- As some of that revenue relates to initial app purchases (at the level of app distribution), I deduct an estimate of the proportion of the amount attributed to initial app sales. Google's global revenue from app sales in 2019 was [REDACTED], which accounts for approximately [REDACTED] of its total revenue.<sup>738</sup> Based on that calculation, I find Google's 2019 global revenue from in-app transactions is [REDACTED].
- I then estimate revenues for in-app purchases through alternative app stores, starting with the Amazon Appstore. Amazon's internal documents show that Amazon's global revenues from app-related transactions via the Amazon App store [REDACTED] in 2018, to [REDACTED] in 2019, [REDACTED] in 2020.<sup>739</sup> Note that the split between initial app purchases and in-app transaction is not available, so I conservatively assume 100% of the revenue relates to in-app transactions.
- Absent detailed revenue data on other third-party Android apps stores, I use Google's internal estimate of Samsung's global revenues from the Galaxy Store in 2019 of [REDACTED]

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<sup>737</sup> See Google, "Revenue by app category," GOOG-PLAY-010801685.R. See also Rysman Workpapers.

<sup>738</sup> This is calculated is the total revenue from app sales divided by the total revenue from sales of apps and in-app content. Additionally, Google's total revenue from app sales for the years 2017-2021 is [REDACTED], comprising [REDACTED] of its total revenues from sales of apps and in-app content during the same period (totalling [REDACTED]). See Rysman Workpapers.

<sup>739</sup> See Amazon, AMZ-GP\_00001497. Note that all devices include FireTV, tablets, and 3P devices. See also Rysman Workpapers.

- ██████ to ██████, or an average of ██████,<sup>740</sup> as a reasonable proxy for Samsung's global in-app transaction revenues from the Samsung Galaxy store.
- I do not have any in-app transaction revenue data on any other Android app stores, including Aptoide, Oppo Apps, Xiaomi Market, Vivo App Store, ONE store, and Yandex. As described in Section VI.A.3, the global share of monthly app store visits for Xiaomi Market, Oppo Apps, and Vivo App Store ██████ are ██████ the global share of the Samsung Galaxy Store ██████.<sup>741</sup> I also know that Google has compared off-Play installs from Samsung Galaxy Store ██████ Aptoide ██████ and ONE store ██████.<sup>742</sup> I then assume the remaining gap of about ██████ approximates the off-Play installs from Yandex. I therefore assume Aptoide, ONE store, and Yandex have the same aggregate market share (and revenue) as Samsung ██████.
  - Combining these estimates for the other Android app stores suggests the revenues from in-app transactions on all other Android app stores is ██████ the Samsung Galaxy Store revenues, or approximately ██████ in 2019.<sup>743</sup>
  - Lacking data on other Android app stores for 2017, 2018, 2020 and 2021, I estimate these revenues assuming these app stores have grown at the same rate as the Amazon App Store.
  - Finally, I also include in-app revenues from subscriptions that take place off the app stores (*e.g.*, Spotify), which are proxied by the revenues from subscriptions on the Google Play Store, calculated as approximately ██████ in 2019 using the Google Play Store transaction data.<sup>744</sup>

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<sup>740</sup> See Google, "Boosting Top Game Developer Support & Securing Play Distribution on Samsung Devices," April 9, 2019, GOOG-PLAY-003332817.R-864.R, at 863.R.

<sup>741</sup> See Google, "OEM App Store Share Analysis," October 31, 2019, GOOG-PLAY-002076224.R-238.R at 229.R.

<sup>742</sup> Note that the off-Play installs are estimated in a 7-day window. See Google, "Special Topic: Off-Play Installs (a.k.a, Sideloaded)," GOOG-PLAY-004489655.R-663.R, at 658.R.

<sup>743</sup> See Rysman Workpapers.

<sup>744</sup> See GOOG-PLAY-010801685. See also Rysman Workpapers.

355. Based on this methodology, in 2019 Google Play Billing's market share is therefore approximately [REDACTED], calculated as Google Play Billing's in-app transaction revenues of [REDACTED] divided by the total in-app transaction revenues from all Android in-app transactions of [REDACTED]. I also calculate a growth rate of [REDACTED] for Amazon's IAP revenues between 2018 and 2020 and apply this growth rate to derive the revenues for other stores for the years with incomplete data.<sup>745</sup> The estimated market shares are consistent across 2017 to 2021, as shown in Exhibit 52 below.

**Exhibit 52**  
**Google Play Billing's Market Share**

Sources of IAP Revenues	In-App Revenues (\$ Million)					Shares of In-App Revenues				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Google Play Store	[REDACTED]					[REDACTED]				
Amazon Appstore										
Samsung Galaxy Store										
Other Android App Stores										
Non-app store										
<b>Total</b>	[REDACTED]					[REDACTED]				

*Sources:*

1. GOOG-PLAY-010801685.
2. AMZ-GP\_00001497.
3. GOOG-PLAY-003332817.R at 863.R.

356. My estimation of Google's share of the Android In-App Billing Services Market described above includes several conservative assumptions, including assuming (i) that all Amazon's revenue is from in-app payments, and (ii) that many of the other Android app stores are a similar size to Samsung (which is highly unlikely given that the Samsung Galaxy Store is pre-installed on every Samsung mobile device. Therefore, I consider [REDACTED] to be a lower bound of Google's actual market share in the In-App Billing Services Market, which suggests Google, via Google Play Billing, has monopoly power in the Android In-app Billing Services Market. However, as noted above, high shares alone are not sufficient to demonstrate monopoly power but must be

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<sup>745</sup> See Rysman Workpapers. This assumption is conservative because if these third-party app store did not grow as fast as [REDACTED] (which is likely), then Google's market share would be even higher.

reinforced with high barriers to entry. I next consider whether there are barriers to entry / expansion that limit the ability of potential entrants or existing rivals to constrain Google.

b) Substantial barriers to entry and expansion protect Google's market power

357. Google's contractual agreements with developers, described in Section IV, have limited the extent to which developers can choose their own billing service provider for in-app transactions. As described in Section IV.B.6, Google requires that: (1) apps distributed via Google Play Store ("Play-distributed apps") must use Google Play Billing exclusively for digital in-app transactions; and (2) developers cannot steer consumers to billing service providers other than Google Play Billing for digital in-app purchases.<sup>746</sup> These restrictions have forced developers to either integrate Google Play Billing for digital in-app transactions, or offer a consumption-only app.<sup>747</sup> For example, [REDACTED] wanted to use its own in-app billing system because of lower processing costs but ultimately agreed on "a GPB-compliant path for policy enforcement and will be consumption-only on the Play [S]tore."<sup>748</sup> Similarly, Microsoft xCloud launched a special version of the Xbox Game Pass app that allowed in-app purchases on the Samsung Galaxy Store while offering consumption-only on the Google Play Store.<sup>749</sup>

358. In addition, developers that choose to not comply with Google's restrictions must forego distributing apps through the Google Play Store and, thus, to potentially all Android users.

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<sup>746</sup> See, e.g., §§ 1-4 in "Google Play Payments Policy," Google, November 18, 2021, available at <https://support.google.com/googleplay/android-developer/answer/9858738>.

<sup>747</sup> See, e.g., Google, "Understanding Google Play's payments policy – Frequently asked questions," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en-GB#zippy=%2Ccan-i-offer-a-consumption-only-reader-app-on-google-play>. ("Google Play allows any app to be consumption-only, even if it is part of a paid service. For example, a user could log in when the app opens and access content paid for somewhere else.").

<sup>748</sup> See, Google, [REDACTED] Code Yellow Proposal," August 2017, GOOG-PLAY-000262353.R-389.R, at 359.R [REDACTED] needs to justify the 15% rev share versus their internal 3-5% payment processing costs"). See also Google, "P&E BD Ops Meeting Bi-Weekly," February 10, 2021, GOOG-PLAY-003890736.R-748.R, at 744.R; and Google, "Project Magical Bridge," August 2019, GOOG-PLAY-007328838-878, at 856; and Google, "Aligning YouTube and Play Billing experiences," March 9, 2018, GOOG-PLAY-000051671.R-701.R, at 698.R.

<sup>749</sup> Email from Sarah Karam, Google, to play-apps-bd-accounce@google.com, Google, "Subject: Apps BD Summer 2020 Update," September 4, 2020, GOOG-PLAY-005610941-943 at 943 ("Microsoft xCloud publicly announced a special version of the Xbox Game Pass app coming to Samsung's Galaxy Store that allows players to make in-app purchases. Ending tests with Apple for now due to Apple policies. Pursuing consumption only on Google Play.").

For example, top developers such as Riot and Activision Blizzard expressed “discontent over Play rev share” and have been actively considering “whether to launch new mega title off Play.”<sup>750</sup>

359. These contractual restrictions naturally create a substantial barrier to entry and expansion in the Android In-App Billing Services Market since, without the ability to switch billing service providers, third party providers are unable to challenge Google Play Billing’s position in the market. Consequently, and as noted above, approximately 97% of developers use Google Play Billing. Even for the 3% who were not using Google Play Billing (see above), Google had an active plan to make sure developers were complying with its policies.

360. As explained in Sections VI.A above, Google has substantial market power in the Android App Distribution Market. The above evidence suggests that, through the contractual restrictions Google has imposed on developers, Google leverages this market power into Android In-App Billing services Market.

### 3. *Summary on Google’s Market Power in the Android In-App Billing Services Market*

361. Based on the evidence and my assessment described above, I find Google has monopoly power in the Android In-App Billing Services Market, which is indicated by Google Play Billing’s very high share of transactions (approximately █████ from 2018 to 2020), coupled with substantial barriers to entry, and Google’s ability to impose contractual restrictions that require developers to use Google Play Billing for their in-app transactions (which Google can impose due to its market power in the Android App Distribution Market). The result is that Google can charge a supra-competitive commission on in-app transactions (still averaging █████ in 2021 – see Exhibit 35), with only the very largest developers able to by-pass Google’s commission.

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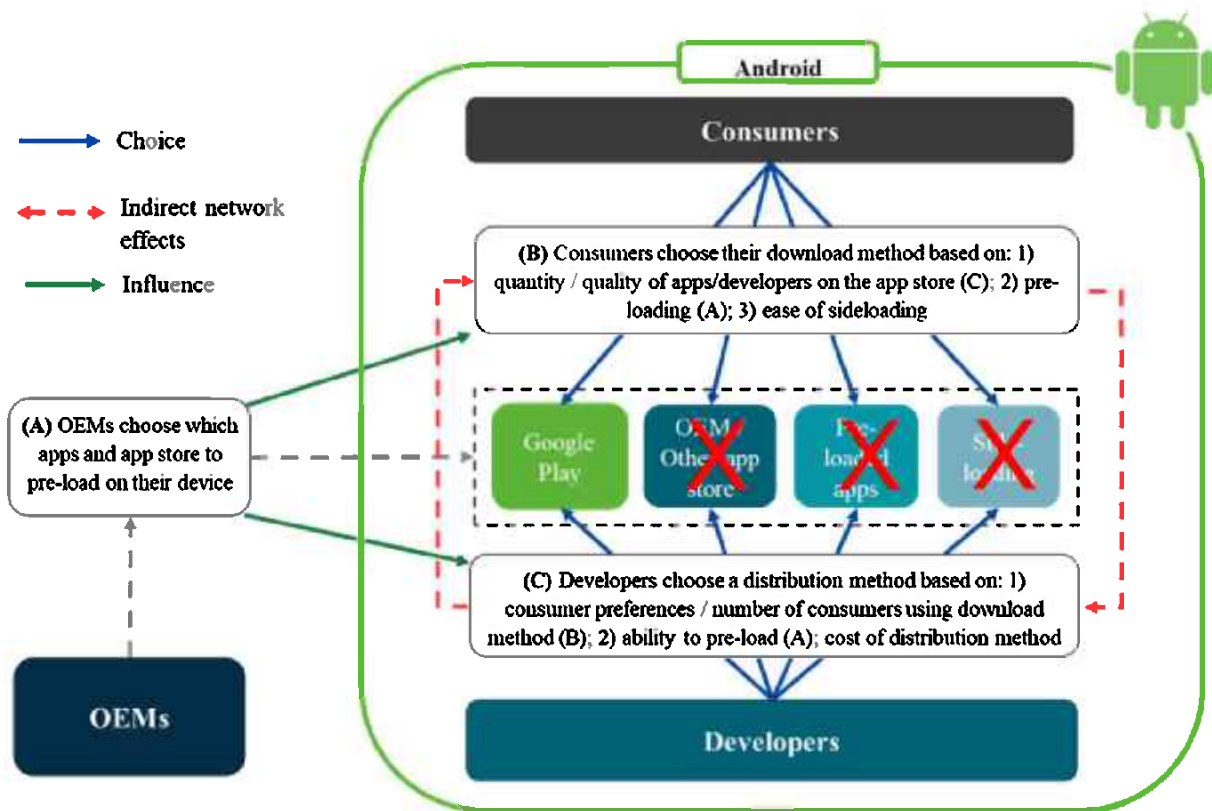
<sup>750</sup> As noted by Google, these developers have the “[c]apabilities to ‘go-it-alone’ on Android” and may ultimately “forgo Play (& Android).” See, Google, “Boosting Top Game Developer Support & Securing Play Distribution on Samsung Devices,” April 9, 2019, GOOG-PLAY-003332817.R-864.R, at 824.R and 830.R.

362. Setting aside Google’s monopoly power in the Android In-App Billing Services Market, it is my opinion that Google has leveraged its market power in the Android App Distribution Market to require most developers to use Google Play Billing.

## **VII. Google’s Anticompetitive Conduct Harmed Competition in Android App Distribution**

363. In this section, I consider whether the conduct described in Section IV made it very difficult for competitors to compete in the Android App Distribution Market described in Sections V.C and VI.A. My conclusion is that it did. I demonstrate that Google’s conduct substantially impeded every possible means by which competing Android app stores might reach the necessary scale to be effective competitors: pre-installation on mobile devices and sideloading by consumers. In addition, Google’s agreements with certain developers deprived competitor app stores of the ability to launch with exclusive content from those developers. Finally, despite the putatively “open” nature of Android, Google has never permitted other app stores to be downloaded through Android Market or the Play Store. The cumulative effect of the obstacles to competition Google has erected are illustrated in Exhibit 53 below.

**Exhibit 53**  
**Google “Closed” Alternative Android App Distribution Channels**



364. As explained below; Google did not always pursue the same anticompetitive strategies; it adapted its behavior to block whatever avenue of competition that it faced. As a result, competing app stores exited or chose not to enter the Android App Distribution Market in two key periods: (1) from 2009 to 2014, following the launch of Android Market in 2009, its expansion through 2012, the launch of the Play Store in 2012, and its expansion through 2014; and (2) a second wave beginning in 2019 following Google’s entry into RSA 3.0 agreements with exclusivity clauses with OEMs.

365. It is my opinion that Google’s anticompetitive conduct reduced competition by rival app stores and had the effect of increasing prices, lowering output, reducing choice, and stifling innovation in the Android App Distribution Market. Moreover, if a rival app store cannot reach a share of consumers, then fewer consumers would attract fewer developers, and then fewer developers would attract fewer consumers, etc. Thus, in a two-sided market, the effect of this reduced competition can be magnified due to indirect network effects.



**A. Google's Anticompetitive Conduct Reduced Competition in the Android App Distribution Market**

*1. Google Has Prevented Competing App Stores from Being Preloaded on Android Smart Mobile Devices*

366. Google has enhanced and entrenched its market power in Android App Distribution through various contractual agreements with mobile network operators (a/k/a wireless carriers), OEMs, and app developers, which substantially reduces competition from alternative Android App Distribution methods. I consider two categories of conduct below. First, I consider the effect of Google's contracts related to a contractual agreement not to preload alternative app stores, often in exchange for a revenue share from Google. I calculate the share of Android smart mobile device sales by OEMs which have executed agreements with such provisions, and, coupled with information from Google that the share of devices subject to such an agreement has been increasing and Google's intention to achieve 100% coverage of devices with this restriction, I find that these shares are reflective of Google's market power in Android App Distribution.

367. I also consider the effect of Google's MADAs by calculating the percentage of Android mobile devices that have been governed by a MADA, which mandate preloading the Google Play Store icon in a particular place on the device user interface and requiring OEMs to license the Google Play Store if they want to provide access to marquee Google apps like Gmail, Search, and YouTube. I explain why these requirements that the Google Play Store receive better or equal treatment to any other Android app store on applicable Android smart mobile devices creates barriers to rivals to obtain such placement or discovery from users.

368. As explained in more detail below, I find Google's contractual restrictions and monetary incentives have had the effect of restricting Android App Distribution outside the Google Play Store and, thus, impeding competition by rival Android app stores.

**a) Google's Revenue Share Agreements**

369. Early on, Google recognized that mobile network operators were key to building its Android ecosystem. Google also recognized that they posed a significant threat to its monopolization of the Android App Distribution Market since they could alter the layout of devices and were best positioned, and even planning, to launch their own rival app stores. For example,

multiple Google documents state that Google did “not want OEMs to build competing application platforms” because Google wanted “[Android] Market to be the key destination for developers and users on Android phones.”<sup>751</sup> Google therefore adopted a business strategy whereby it would share a portion of the revenue Google derived from the sale of apps on Android Market with MNOs and large OEMs, and the counterparty would forego developing its own app store.<sup>752</sup> Those agreements are called “Revenue Share Agreements” or “RSAs.”

370. Google communications make the purpose of these agreements clear. Google recognized that “Android Market is a bitter pill for carriers, and a generous revenue share is the sugar that makes it go down smoother.”<sup>753</sup> Google made clear that it gave carriers “generous revenue share that more or less matches what they would make from their own markets” in order to force carriers to “install and make [Android Market] easily available.”<sup>754</sup> To Google, one of the “[b]enefits and rationale for offering play revenue shares” to carriers was to “[g]et enhanced placement of Play store (equal placement to any other app store program).”<sup>755</sup> Simply put, Google “cut carriers in to disincentivize building their own stores and fragmenting the ecosystem. It worked.”<sup>756</sup>

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<sup>751</sup> Google, “Internal Meeting Notes September 15th 2009,” September 15, 2009, GOOG-PLAY-001399545-546, at 546.

<sup>752</sup> Jamie Rosenberg, Vice President of strategy for platforms and ecosystems at Google, explained that it enters revenue share agreements with carriers when they own the “client ID” for a phone, where “[t]he client ID is an identifier that goes on a device that says this is a device that qualifies for revenue share and...there can only be [one] owner of a client ID for a given device. That can be a carrier. It can be an OEM.” In the U.S., “the carriers do a lot of specifying in terms of what they want on devices, in almost all cases the carriers own the client ID.” He continues to explain that in Europe and Japan, for example, “not all devices are sold through carriers,” in which case “the OEM might retain the client ID.” See Google, “Deposition of Jamie Rosenberg in the Matter of: In Re – Google Antitrust Litigation,” July 14, 2020, GOOG-PLAY-007847148-353, at 273-277.

<sup>753</sup> Email from Tom Moss, Google, to Andy Rubin, Former Google VP and Android Founder, “Subject: Re: Your thoughts on Android Market,” February 3, 2009, GOOG-PLAY-001423609-610, at 609.

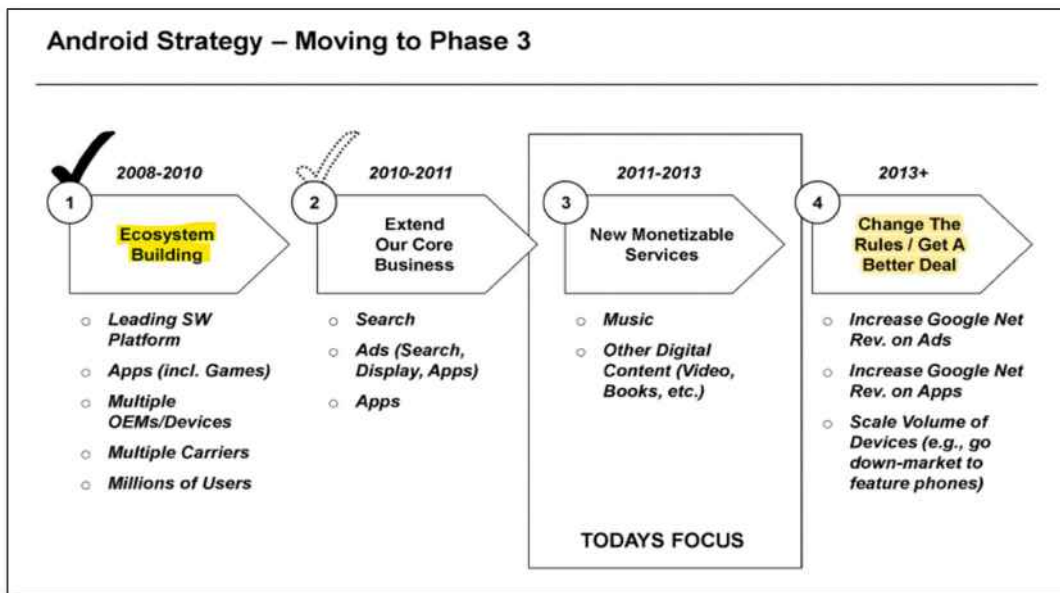
<sup>754</sup> Email from Tom Moss, Google, to Andy Rubin, Former Google VP and Android Founder, “Subject: Re: Your thoughts on Android Market,” February 3, 2009, GOOG-PLAY-001423609-610, at 609.

<sup>755</sup> Google, “Wireless Carrier Project – BD Team Interview,” September 22, 2014, GOOG-PLAY-007264058-069, at 063.

<sup>756</sup> Google, “project gabby,” October 18, 2014, GOOG-PLAY-000439987.R-017.R, at 012.R.

371. Initially, Google gave to carriers the majority of the 30% commission it imposed on developers.”<sup>757</sup> However, Google executives recognized that there would eventually be a “tipping point” “where consumer demand will be so strong [Google] can set different revenue models and carriers will be unable to compete with their own offerings because their own offerings will be so limited in comparison.”<sup>758</sup> At that point, Google would be able to change its revenue model without concern that carriers could launch competing app stores. Google internally characterized its strategy as “Change the Rules / Get A Better Deal.”

**Exhibit 54**  
**Google’s Strategy: Build its Ecosystem and then Change the Rules to Get a Better Deal**



Source: Google, “OC Quarterly Review — 4Q 2010,” October 12, 2010, GOOG-PLAY-001337211-252, at 226 (emphasis added).

372. To execute this business strategy, Google adopted as a matter of company policy a Product Requirements Document for enhancing the revenue sharing on Android Market, one of the

<sup>757</sup> Google’s Android Developers Blog, “Android Market: Now available for users,” October 22, 2008, available at <https://android-developers.googleblog.com/2008/10/android-market-now-available-for-users.html>.

<sup>758</sup> Email from Tom Moss, Google, to Andy Rubin, Former Google VP and Android Founder, “Subject: Re: Your thoughts on Android Market,” February 3, 2009, GOOG-PLAY-001423609-610, at 609.

“[g]oals” of which was to “prevent partners from building their own application stores and fragmenting the Android ecosystem.”<sup>759</sup>

373. By March 2011, Google had adopted RSAs with leading MNOs all over the world, which did more than share revenue; they contained exclusivity provisions.<sup>760</sup> In his testimony in this case, the former director of Android Partner Engineering, Patrick Brady, confirmed that “an exclusivity or ‘no duplication of services’ clause is not an example of Google competing on its merits.”<sup>761</sup>

374. By 2014, Google had agreements that forbade the preloading of competitor app stores with HTC,<sup>762</sup> LG U+ (the MNO),<sup>763</sup> LG (the OEM),<sup>764</sup> T-Mobile (as explained further

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<sup>759</sup> Google, “Scaling Android Market Billing/Reporting and Partner Launches,” April 6, 2010, GOOG-PLAY-010165546-552, at 546; Brady (Google) Deposition, pp. 98-99 (“Q. Okay. What is a PRD? A. That’s an acronym that refers to a product requirements document at Google. Q. And what’s a product requirements document at Google? A. It’s a document that is generally written by a product manager that lays out the important use cases for a product or goals for a product, design constraints, design objectives. Things like that. Q. And was PRD a planning document that Google would create in the ordinary court of business and then keep on file for later reference? A. Generally I would say that’s true.”) and p. 107 (“Q. And what it reads, ‘Android Market partnerships have a renewed focus now so that we can prevent partners from building their own application stores and fragmenting the Android ecosystem.’ Do you see that? A. I do. Q. Okay. And do you believe this to be the PRD document that was linked to the prior exhibit? A. I have no reason to doubt that it is”).

<sup>760</sup> Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to John Lagerling, Former Senior Director of Android Global Partnerships at Google, “Subject: Re: App stores and preinstall risk,” March 25, 2011, GOOG-PLAY4-000268331-332, at 331.

<sup>761</sup> Brady (Google) Deposition, p. 119.

<sup>762</sup> Google and HTC, “Mobile Revenue Sharing Agreement for OEMs (Android),” Feb 1, 2011, GOOG-PLAY-001905152-168, at 158.

<sup>763</sup> The LG U+ agreement had a carveout for the MNO’s own app store, but banned it from placement on the Default Home Screen and required that it could not offer any apps that Android Market did not offer. *See* LG U+ and Google, “Mobile Agreement LG U+ (Android),” July 1, 2011, GOOG-PLAY-001834687-707, at 694; *see also* Google, “Business Development Product Deal Executive Summary,” June 1, 2011, GOOG-PLAY-009691803-806, at 805.

<sup>764</sup> LG and Google, “MADA,” June 1, 2009, GOOG-PLAY-000621177-189, at 186.

below), Deutsche Telecom AG,<sup>765</sup> Huawei,<sup>766</sup> America Movil (which included 19 affiliate MNOs in South America),<sup>767</sup> Rogers (the Canadian MNO),<sup>768</sup> Sony,<sup>769</sup> and ASUS.<sup>770</sup>

375. Consistent with its “change the rules” strategy depicted in Exhibit 54 above, once Google’s power over Android App Distribution had been entrenched, it changed the revenue sharing model. As discussed in Section IV.B.5 above, Google began phasing out payments to carriers, eventually eliminating any payments to them by 2018.<sup>771</sup>

376. Google’s revenue sharing agreements with MNOs and OEMs similarly incentivized these parties to abandon their own app stores and raised the costs for prospective third-party app store developers to compete against Google. I address two examples below.

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<sup>765</sup> Google and T-Mobile, “Amendment No. 5 to Global Cooperation Agreement,” June 21, 2007, GOOG-PLAY-010203197-227, at 223.

<sup>766</sup> Huawei and Google, “MADA,” June 1, 2009, GOOG-PLAY-001745969-981, at 978.

<sup>767</sup> The America Movil agreement did permit the MNOs to preload their own app stores but forbid them from preloading third-party app stores. The 19 MNOs are listed in Exhibit D to the agreement and included MNOs in Mexico, Argentina, Uruguay, Paraguay, Brazil, Colombia, Ecuador, Guatemala, El Salvador, Honduras, Peru, Chile, Nicaragua, the Dominican Republic, Costa Rica, Panama, and two U.S. carriers. *See* Google and America Movil, “Mobile Agreement America Movil (Android),” December 1, 2011, GOOG-PLAY-010207461-479, at 468.

<sup>768</sup> The Rogers agreement permitted Rogers’ own app store, but not third-party stores. *See* Google and Roger Communications Partnership, “Android Search and Google Play Store RSA,” May 1, 2013, GOOG-PLAY-004330716-749, at 723-724.

<sup>769</sup> The Sony agreement permitted Sony’s own app store, but not third-party stores. *See* Google and Sony, “Google Search RSA,” September 1, 2014, GOOG-PLAY-005706073-086, at 076.

<sup>770</sup> The ASUS agreement permitted an ASUS app store, but not third-party stores. *See* Google and ASUS, “Android Search and Google Play RSA,” August 1, 2012, GOOG-PLAY-001467154-174, 159.

<sup>771</sup> [REDACTED]

377. **T-Mobile.** Before Android OS launched on mobile phones, T-Mobile controlled the apps, content, and distribution loaded onto its devices.<sup>772</sup> In 2007, Google and T-Mobile entered into a “Global Cooperation Agreement” (hereinafter “RSA”) to “establish a framework for their cooperation in the integration and deployment of new software and services for mobile devices.”<sup>773</sup>

378. T-Mobile later announced plans to launch an Android app store in the Fall of 2008.<sup>774</sup> T-Mobile’s contemplated app store would be available for all Android smart mobile devices, among other platforms.<sup>775</sup> T-Mobile planned to monetize based on bandwidth use.<sup>776</sup> T-Mobile’s strategy was to “gut its current, lousy method of distributing mobile apps -- favoring software companies that it has revenue-sharing deals with,” like Google, and to instead launch, “[a]n iPhone-like app store that's organized by popularity, not payola.”<sup>777</sup>

379. A 2009 amendment to the RSA with Google established that T-Mobile would receive a 25% share of Android Market apps transaction revenues.<sup>778</sup> The parties amended the RSA again in December 2009 to introduce Direct Carrier Billing (“DCB”), which gave T-Mobile an

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<sup>772</sup> Sears (Google) Deposition pp. 34-37.

<sup>773</sup> “Global Cooperation Agreement Between Google and T-Mobile,” GOOG-PLAY-001377621-679, at -621, § 1.

<sup>774</sup> See Duryee, Tricia, “Updated: T-Mobile USA Will Ditch The Traditional Deck to Mirror Apple’s App Store,” The Washington Post, August 11, 2008, available at <https://www.washingtonpost.com/wp-dyn/content/article/2008/08/08/AR2008080802548.html>; Frommer, Dan, “T-Mobile’s Big Idea: An iPhone-Like App Store for Every Phone,” Business Insider, August 9, 2008, available at <https://www.businessinsider.com/2008/8/t-mobile-s-big-idea-an-iphone-like-app-store-for-every-phone/>; Krzykowski, Matthaus, “Carriers being to believe in data revenue, as Android’s puzzle pieces come together,” September 10, 2008, available at <https://venturebeat.com/2008/09/10/carriers-begin-to-believe-in-data-revenue-as-androids-puzzle-pieces-come-together/>; and TechCrunch, “T-Mobile planning an open app store?,” August 11, 2008, available at <https://techcrunch.com/2008/08/11/t-mobile-planning-an-open-app-store/>.

<sup>775</sup> See Duryee, Tricia, “Updated: T-Mobile USA Will Ditch The Traditional Deck to Mirror Apple’s App Store,” The Washington Post, August 11, 2008, available at <https://www.washingtonpost.com/wp-dyn/content/article/2008/08/08/AR2008080802548.html>.

<sup>776</sup> See TechCrunch, “T-Mobile planning an open app store?,” August 11, 2008, available at <https://techcrunch.com/2008/08/11/t-mobile-planning-an-open-app-store/>.

<sup>777</sup> Frommer, Dan, “T-Mobile’s Big Idea: An iPhone-Like App Store for Every Phone,” Business Insider, August 9, 2008, available at <https://www.businessinsider.com/2008/8/t-mobile-s-big-idea-an-iphone-like-app-store-for-every-phone/>; Krzykowski, Matthaus, “Carriers being to believe in data revenue, as Android’s puzzle pieces come together,” September 10, 2008, available at <https://venturebeat.com/2008/09/10/carriers-begin-to-believe-in-data-revenue-as-androids-puzzle-pieces-come-together/>; and TechCrunch, “T-Mobile planning an open app store?,” August 11, 2008, available at <https://techcrunch.com/2008/08/11/t-mobile-planning-an-open-app-store/>.

<sup>778</sup> Google and T-Mobile, “Amendment No.2 to Global Cooperation Agreement,” August 10, 2009, GOOG-PLAY-001424478-491, at 479-480.

additional 2% points of revenue on top of the 25% when users transacted through DCB.<sup>779</sup> Google also encouraged T-Mobile to distribute and promote a limited number of apps through Android Market on a featured “Carrier Channel.”<sup>780</sup> The same amendment introduced an exclusivity clause for mobile devices branded as “With Google,” stating: “No widget, pointer or application that is substantially similar to Google Search, Google Maps or Android Market may be preloaded on any ‘With Google’ Phone.”<sup>781</sup>

380. T-Mobile executives acknowledged that “in an effort to make everyone just use the default Google [P]lay [S]tore[,] Google did some rev share deals to incentivize the carriers” not to develop or continue developing their own app stores.<sup>782</sup> Google’s documents confirm that was precisely the purpose of the revenue-share agreements. In 2009, Nick Sears, one of the Android OS cofounders and owner of the T-Mobile deals and negotiations at Google<sup>783</sup>, stated that “T-Mobile was going to build their own store for launch and they negotiated that right in our first contract,” but

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<sup>779</sup> Google and T-Mobile, “Amendment No.3 to Global Cooperation Agreement,” December 1, 2009, GOOG-PLAY-005706961-981, at 962-968.

<sup>780</sup> Google and T-Mobile, “Amendment No.3 to Global Cooperation Agreement,” December 1, 2009, GOOG-PLAY-005706961-981, at 980, at 967-968.

<sup>781</sup> Google and T-Mobile, “Amendment No.3 to Global Cooperation Agreement,” December 1, 2009, GOOG-PLAY-005706961-981, at 980.

<sup>782</sup> Email from Samuel Ninis, T-Mobile, to Brian Bell, T-Mobile, Jeff Giard, T-Mobile, Taylor Prewitt, T-Mobile, Clint Patterson, T-Mobile, Mike Belcher, T-Mobile, “Subject: RE: Media // Telecom + Play Store,” August 19, 2021, GP MDL-TMO-0132828-830, at 828.

<sup>783</sup> Rubin (formerly Google) Deposition, pp. 26 -27 (“Nick Sears was . . . a former product marketing person for T-Mobile. He actually helped us at Danger. He was the – he was the counterpart in marketing in T-Mobile when Danger launched, so we brought him on and he was focused on kind of product positioning, you know, go-to-market, you know, strategy and things like that and obviously [was] quite good at his job.”); Rubin (formerly Google) Deposition, p. 26 (“Q. You mentioned co-founders. Who were your co-founders at Android? A. Chris White, Rich Miner, and Nick Sears.”); GOOG-PLAY-001135055-086, at 057 (“October, 2003: Android is founded in Palo Alto, CA by Andy Rubin, Rich Miner, [later] Nick Sears, and Chris White”); Sears (Google) Deposition, p. 184 (“Q. I think we saw a timeline earlier today that mentioned you as one of the founders of Android. Is that a true characterization? A. Android post October, yeah. I mean you saw in that timeline that Android was founded before that, but its business direction changed in sometime after October. And so I would have been considered a founder for – for that point on, for that purpose.”).



they “ended up not building their own store.” He explained “[t]he reason we paid T-Mobile rev share is to keep them from creating their own store where they would get far more than 25%.”<sup>784</sup>

381. Google’s strategy worked. By 2010, T-Mobile had told Google that it no longer intended to build a separate app store.<sup>785</sup>

382. *HTC*. As explained above in Section III, HTC was the OEM for the first Android smartphone released on the T-Mobile network in 2008. But Google did not offer GMS apps through the MADA worldwide at that time. In some countries where GMS—and thus the Android Market—were unavailable, like Egypt,<sup>786</sup> Saudi Arabia,<sup>787</sup> Malaysia, and Vietnam,<sup>788</sup> HTC phones came preloaded with an alternative app store from SlideME, the SlideME Application Manager<sup>789</sup>.

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<sup>784</sup> Email from Nick Sears, Android Co-Founder, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, “Subject: Re: Market, Passion & TMUS negotiations,” October 29, 2009, GOOG-PLAY4-000339905-910, at 907 and Email from Nick Sears, Android Co-Founder, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, “Subject: Re: Market, Passion & TMUS negotiations,” November 5, 2009, GOOG-PLAY4-000339905-910, at 905.

<sup>785</sup> Email from Cole Brodman, T-Mobile, to Andy Rubin, Former Google VP and Android Founder, “Subject: Re: Google market feeds,” September 27, 2010, GOOG-PLAY-001055565-567, at 565 (“As we discussed, we are committed to not fragmenting the market. The goal is to use your master, global market to attract developers and publish content”) and Email from Mitch Lustig, T-Mobile, to Jamie Rosenberg, Vice President of Strategy and Operations (Platforms and Ecosystems Division) at Google, “Subject: FW: Google market feeds,” October 4, 2010, GOOG-PLAY-001143425-427, at 425 (T-Mobile to Jamie Rosenberg: “To belay any concerns, we are absolutely not building another market”).

<sup>786</sup> Email from Limvirak Chea, Google, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, “Subject: Re: [Pso-android] Re: [android-emea] Fwd:[Arabic-core] Fwd: Announcement: First Android localized devices launched by two operators in MENA region,” November 3, 2009, GOOG-PLAY-010524137-140, at 137 (“I’ve seen another announcement that Vodafone ships the HTC Magic in Egypt without Android Market, but with SlideMe app store”) and Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Limvirak Chea, Google, “Subject: Re: [Pso-android] Re: [android-emea] Fwd:[Arabic-core] Fwd: Announcement: First Android localized devices launched by two operators in MENA region,” November 3, 2009, GOOG-PLAY-010524137-140, at 137 (“HTC is shipping SlideME instead of Market b/c we are unable to launch Market in Egypt (and several other countries) at this time. Unfortunate, but looks like that’s going to be the norm in many places where Market is ‘N’”).

<sup>787</sup> Email from Maarten Hooft, Google, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, David Conway, Google, “Subject: Re: Vodafone Egypt does not include Android Market, but SlideME instead?,” November 2, 2009, GOOG-PLAY-010470999 (“Vodafone Egypt does not include Android Market, but SlideME instead? . . . Yes, this is normal. In countries where we do not allow distribution of Market, OEM’s have used ‘SlideME’. The same solutions has been used for Saudi Arabia”).

<sup>788</sup> SlideME, “SlideME’s SAM Marketplace Shows Up on the HTC Hero,” September 3, 2009, available at <http://slideme.org/blog/htc-hero>.

<sup>789</sup> SlideME, “SAM on HTC Mobile Devices,” available at <http://slideme.org/sam-htc-mobile-devices>.

SlideME “found a niche,” by loading its app store onto devices in regions where Google could not or would not load Android Market.<sup>790</sup>

383. That changed in February 2011, when HTC and Google executed a worldwide revenue sharing agreement that prohibited HTC from pre-installing third-party app stores like SlideME. The original RSA had a term of 23 months and required that HTC “will not, and will not allow any third party to: implement on a Device any application, product or service which is the same as or substantially similar to Android Market, Google Phone-top Search or the Google Mobile Search Service (or any part thereof).”<sup>791</sup> Thereafter, SlideME was not preinstalled on any new HTC devices.<sup>792</sup>

384. Google’s RSA strategy was not limited to carriers. Google eventually expanded the strategy to include Android OEMs in order to “[i]ncentivize OEMs to prioritize Play” rather than develop or continue developing their own apps stores.<sup>793</sup>

385. In order to “respond to the threat these new entrants pose on [Google’s] core business,” Google decided to “[c]reate barriers to entry,” by incentivizing “pre-load exclusivity” through deals with OEMs.<sup>794</sup> In 2014, Google spent [REDACTED] on “partner revenue share” and was projected to spend [REDACTED] drive device penetration, and [REDACTED] to drive Google services on Android devices” in 2015.<sup>795</sup> Google planned to spend a total of [REDACTED] in 2020 across Search and Play and to increase the total spend to [REDACTED] in 2023.<sup>796</sup>

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<sup>790</sup> Email from Dan Morril, Google, to Nikhil Shanbhag, Google, “Subject: Re: alternative Android app distribution sites,” December 7, 2009, GOOG-PLAY-007587989.

<sup>791</sup> Google and HTC, “Mobile RSA for OEMs (Android),” February 1, 2011, GOOG-PLAY-001905152-168, at 158.

<sup>792</sup> Christopoulos (SlideME) Deposition, September 9, 2022, at p. 44 (“Q. I would like to circle back to HTC and ask when SlideME stopped being preloaded onto HTC mobile devices? Just a ballpark year. A. Okay. Two years. It lasted for two years. Q. All right. So that would be 2011; is that right? A. 2009, they started; 2011, that would be right”).

<sup>793</sup> Google, “Let’s talk about business model,” GOOG-PLAY-000443763.R-798.R, at 774.R.

<sup>794</sup> Google, “project gabby,” October 18, 2014, GOOG-PLAY-000439987.R-017.R, at 006.R-007.R.

<sup>795</sup> Google, “Android Partnerships Strategy Rethink,” May 6, 2015, GOOG-PLAY-001184813-857, at 820-821.

<sup>796</sup> Google, “BC: GDAF (Google Distribution on Android Framework) – evolution of RSA deals (BC19-019),” May 6, 2019, GOOG-PLAY4-007239946-951, at 946.

386. By sharing its enormous monopoly rents, Google disincentivized OEMs from creating their own app stores or promoting a competing app store. For instance, under the Google-Forward program, OEMs are paid “up to 20% Play rev-share” on the condition of “preload[ing] Play as the exclusive app store on devices.”<sup>797</sup> Major OEMs, such as Samsung, Sony, LG, and HP, as well as the largest MNOs, including Verizon, SKT, AT&T, Telefonica, and Vodafone have all been part of Google’s revenue-sharing program.<sup>798</sup>

387. In addition to the more general RSAs Google executed, since 2018 Google has included exclusivity clauses more broadly in its RSAs with OEMs.<sup>799</sup> Google’s RSAs require OEMs to meet certain criteria setting the Google Play Store “preloaded and on the home screen with as good as or better placement than competing app store[s].”<sup>800</sup>

388. Starting in 2019, Google developed RSA 3.0 agreements with OEMs that included restrictions on what can be installed on devices. For example, Google required OEMs to place the Google Play Store as the “only application store on Default Home Screen” and set as the “default marketplace for applications, games, books, movies, music, and all other digital content (including subscriptions).”<sup>801</sup> In order to qualify for certain revenue share tiers, OEMs have to agree not to preload competitive apps in addition to Google apps.<sup>802</sup>

389. For example, Premier Tier Requirements as of June 12, 2020 pertain to “all Premier Devices, released under the Google Revenue Share Agreement” and require preload exclusivity for a large number of Google apps including Google Play.<sup>803</sup> Specifically, among other things, the Premier Tier Requirements states that: “Unless otherwise specified by Google in writing,

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<sup>797</sup> Google, “Let’s talk about business model,” GOOG-PLAY-000443763.R-798.R. at 775.R.

<sup>798</sup> Google, “Android Partnerships Strategy Rethink,” May 6, 2015, GOOG-PLAY-001184813-857, at 824 and 833.

<sup>799</sup> Google, “Let’s talk about business model,” GOOG-PLAY-000443763.R-798.R, at 775.R.

<sup>800</sup> Google, “Android Partnerships Strategy Rethink,” May 6, 2015, GOOG-PLAY-001184813-857, at 823.

<sup>801</sup> Google and OnePlus, “Google Mobile Revenue Share Agreements,” February 1, 2020, GOOG-PLAY-000416651-697, at 679.

<sup>802</sup> Kolotouros (Google) Deposition, p. 115 (“Q. In at least some of the tiers of the RSAs, there are such restrictions in connection with the devices on those tiers, correct? A. To the extent the OEM is elected to enroll the device in that tier, yes. Q. And if they elect into those tiers, they get more money in terms of revenue share than the lower tier, the base tier that you were just describing, right? A. That is correct, yes”).

<sup>803</sup> Google, “Premier Tier Requirements,” July 31, 2020, GOOG-PLAY-007125883-889, at 883.

application preloads ... MUST NOT overlap with the following Google preloads in terms of the applications, features, or functionality: Chrome Browser, Contacts, Duo, Gboard, Gmail, Google Assistant, Google Calendar, Google Discover, Google Lens, Google News, Google One, Google Pay, Google Photos, Google Play, Google Podcasts, Google Search app, Messages, and Phone (Dialer)....”<sup>804</sup>

390. In addition, the document requires that preloads “MUST be available in Google Play,” “MUST be offered via Play-Auto-Install,” and “MUST NOT contain INSTALL\_PACKAGES permissions.”<sup>805</sup> RSA requirements also prohibit participating OEMs to promote an “Alternative Service.”<sup>806</sup> Specifically, OEMs “will not and will not allow any third party to...include in any manner on Premier Device... any Alternative Service... introduce, promote, or suggest... an Alternative Service to an End User...”<sup>807</sup>

391. Internal Google documents explain that the purpose of “Search and Play rev share” under the RSA 3.0 is [REDACTED]<sup>808</sup> Before Google’s Business Council approved the RSA 3.0 framework, a presentation was given outlining the deal strategy, which explained that the “priorities for renewing RSA deals” were to [REDACTED]

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<sup>804</sup> Google, “Premier Tier Requirements,” July 31, 2020, GOOG-PLAY-007125883-889, at 886.

<sup>805</sup> Google, “Premier Tier Requirements,” July 31, 2020, GOOG-PLAY-007125883-889, at 886. Google Mobile Incentive Agreements also include similar requirements. *See, e.g.*, Google and LGE, “Google Mobile Incentive Agreement,” April 1, 2020, GOOG-PLAY-005706338-391, at 378.

<sup>806</sup> Google and HMD Global, “Google Mobile RSA 2020,” December 1, 2019, GOOG-PLAY-000620282-321, at 284 (“**Alternative Service**” means any Alternative Search Service, Alternative Visual Search Service, Alternative Assistive Service, Alternative Play Service, or Alternative Functions”).

<sup>807</sup> Google and HMD Global, “Google Mobile RSA 2020,” December 1, 2019, GOOG-PLAY-000620282-321, at 292. *See also* Google and OnePlus, “Google Mobile RSA,” February 1, 2020, GOOG-PLAY-000416651-697, at 662; Google and Oppo, “Google Mobile RSA,” March 1, 2020, GOOG-PLAY-001745614-663, at 625-626; Google and Positivo Tecnologia S.A., “Google Mobile RSA,” March 1, 2020, GOOG-PLAY-000620442-475, at 452; Google and Sharp, “Google Mobile RSA,” April 1, 2020, GOOG-PLAY-000416708-752, at 717; Google and TCT, “Google Mobile RSA,” April 1, 2020, GOOG-PLAY-000620478-520, at 488; Google and Vinsmart, “Google Mobile RSA,” March 1, 2020, GOOG-PLAY-000620131-172, at 141; Google and Xiaomi, “Google Mobile RSA,” March 1, 2020, GOOG-PLAY-000620638-675, at 649; Google and BLU Products, “Google Mobile RSA,” April 1, 2020, GOOG-PLAY-005706676-704, at 685; Google and Shenzhen Tinno Wireless Technology and Wiko S.A.S., “Google Mobile RSA,” April 1, 2020, GOOG-PLAY-005706728-756, at 737; Google and Sony, “Google Mobile RSA,” April 1, 2020, GOOG-PLAY-005706436-484, at 446; and Google and Transsion, “Google Mobile RSA,” September 1, 2020, GOOG-PLAY-000620770-798, at 778.

<sup>808</sup> Google, “2020 Plan of Record Google Pay Carrier & OEM Partnerships,” February, 2020, GOOG-PLAY4-006758735-764, at 738.

\_\_\_\_\_ including seeking \_\_\_\_\_ in light of “[o]ther APK-installers” such as \_\_\_\_\_  
 \_\_\_\_\_.<sup>809</sup>

392. LG and Motorola have exceptions to the Play Store exclusivity provision for their own stores but not for third-party app stores, and, as a result, third-party app stores cannot be pre-installed on LG and Motorola devices. Furthermore, Samsung devices have the Samsung Galaxy Store pre-installed in addition to the Google Play Store, but Samsung does not permit alternative Android app stores to be distributed through the Samsung Galaxy Store.<sup>810</sup> Thus, to be distributed on Samsung smart mobile devices, other alternative Android app stores would need to be sideloaded and, thus, subject to the technological barriers, another means by which Google impedes rival Android app stores, as described in Section VII.A.2 below. Alternatively, while the rival Android app store could negotiate with Samsung to be distributed alongside the Galaxy Store or instead of it, I have found no evidence of Samsung preloading a third-party app store on its smart mobile devices.

393. These exclusivity RSAs with OEMs allow Google to maintain its market power in Android App Distribution and stifle entry/expansion by third-party app stores seeking to be preloaded on mobile devices. These RSAs dampened OEMs’ incentives to license from an alternative mobile OS (or develop their own fork of Android, like Amazon).<sup>811</sup> I understand that Google’s RSAs with OEMs include Google search as the default search engine,<sup>812</sup> which allows Google to use the revenue it generates from Google Search to fund its agreements with OEMs. I also understand that Google generates less revenue from the MADA license fees than it pays to OEMs under the RSAs – meaning Google effectively pays OEMs to adopt the Android OS.<sup>813</sup> Consequently, for a new entrant to challenge Google’s Android OS, they would need to provide

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<sup>809</sup> Google, “ACPX/BC Review: Google Distribution Agreements Framework,” June, 2019, GOOG-PLAY-00457156.R-204.R, at 158.R-159.R.

<sup>810</sup> Samsung Galaxy Store, “App Distribution Guide,” available at <https://developer.samsung.com/galaxy-store/distribution-guide.html> (“Apps that offer app download inside the app are not allowed”).

<sup>811</sup> Amazon, “Fire OS Overview,” available at <https://developer.amazon.com/docs/fire-tv/fire-os-overview.html#fire-os-versions>.

<sup>812</sup> See, CMA Final Report on Mobile Ecosystems, ¶3.153.

<sup>813</sup> See, CMA Final Report on Mobile Ecosystems, ¶3.154.

similar incentives to OEMs, essentially monetizing their OS in the same way as Google does with Google Search. However, given Google's strength in the search advertising and search engines market,<sup>814</sup> a new mobile OS entrant would likely be unable to leverage search advertising / search engine revenue to the same extent as Google. Therefore, an OEM switching to a new licensable mobile OS in order to develop its own app store or distribute apps outside the Google Play Store would lose a significant amount of revenue,<sup>815</sup> in addition to losing access to the popular GMS suite of apps and APIs. Further, Amazon noted "customers expect a certain 'out of the box' experience with popular and desirable apps pre-installed on their device and that some of the most popular apps are Google apps such as Google Maps and YouTube, which are included in the GMS suite."<sup>816</sup> Thus, Google's exclusivity requirement creates a substantial barrier to entry / expansion for a new mobile OS provider.

394. Google's RSAs have expanded to a large proportion of Android smart mobile devices from major OEMs, ensuring no alternative app distribution platforms can be installed on these devices. In 2019, Google intended to increase the proportion of Android smart mobile devices covered by RSAs from nearly [REDACTED] to [REDACTED].<sup>817</sup> As noted in a January 2021 Google document, as of January 2021, Google had signed RSAs with at least 13 OEMs including Samsung, Huawei, LG, OnePlus, Sony, Vivo, and Xiaomi,<sup>818</sup> and the share of devices sold under RSA 3.0 Premier Tier is [REDACTED] in Great Britain and at least [REDACTED] in France, Germany, and Brazil, with the share of devices

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<sup>814</sup> Google has more than 90% share in search engines. *See* Statcounter, "Search Engine Market Share Worldwide," available at <https://gs.statcounter.com/search-engine-market-share>. Additionally, the CMA Market Study into Online Platforms and Digital Advertising found that "Google has significant market power in the general search sector, having had a share of supply of around 90% or higher in the UK for more than a decade. Google's strong position is primarily maintained by three key barriers to entry and expansion: economies of scale in developing a web index; access to click-and-query data at scale; and Google's extensive default positions." *See* CMA, "Online platforms and digital advertising Market Study Final Report," July 1, 2020, available at [https://assets.publishing.service.gov.uk/media/5fa557668fa8f5788db46efc/Final\\_report\\_Digital\\_ALT\\_TEXT.pdf](https://assets.publishing.service.gov.uk/media/5fa557668fa8f5788db46efc/Final_report_Digital_ALT_TEXT.pdf).

<sup>815</sup> For example, according to Google, the top 16 OEMs received [REDACTED] in revenue share from January to September 2020. *See* Google, "Android Commercial Agreements Exec Discussion," October, 2020, GOOG-PLAY-011057832-886, at 834.

<sup>816</sup> *See*, CMA Final Report on Mobile Ecosystems, ¶3.163.

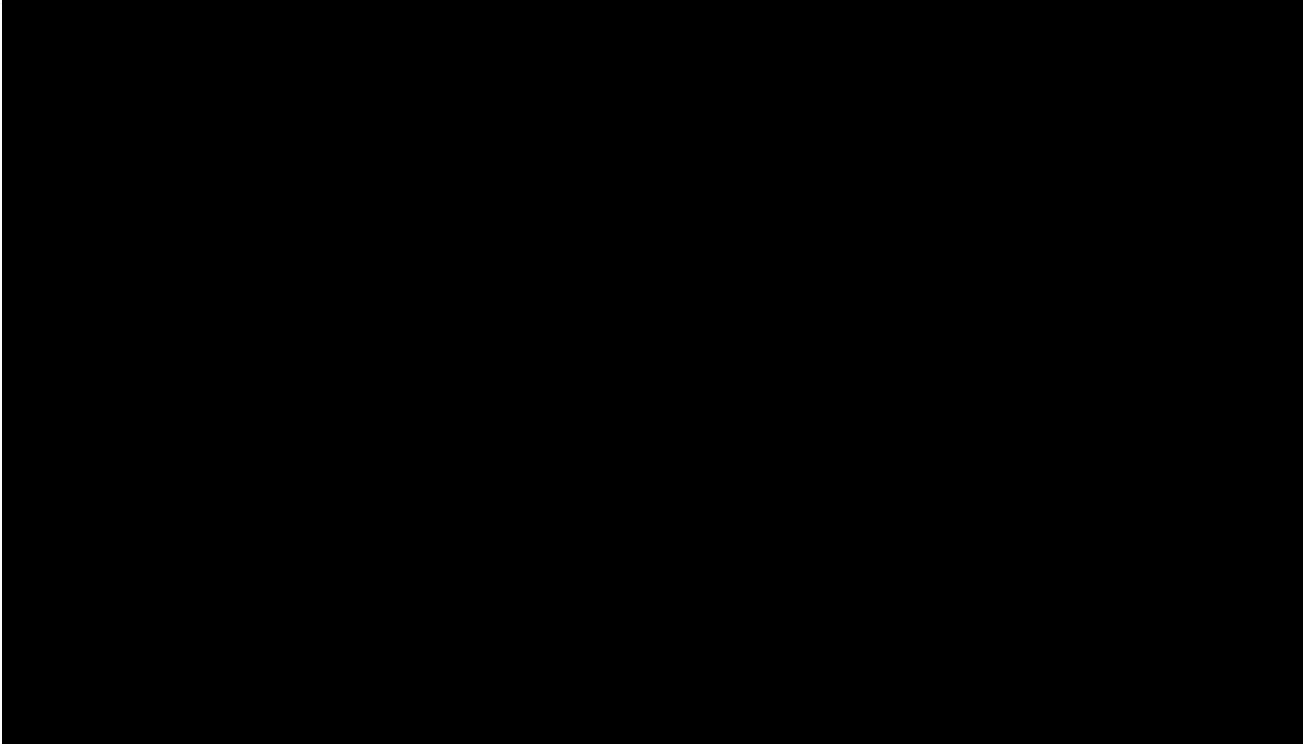
<sup>817</sup> Google, "BC: GDAF (Google Distribution on Android Framework) – evolution of RSA deals (BC19-019)," May 6, 2019, GOOG-PLAY4-007239946-951, at 949.

<sup>818</sup> Google, "P&E Partnerships Ops Meeting Bi-weekly," February 24, 2021, GOOG-PLAY-003894142.R-177.R. at 173.R.



sold under all RSA versions reaching between [REDACTED] to [REDACTED] in these countries.<sup>819</sup> Worldwide, Google estimated that in 2019 around [REDACTED] of new Android activations were governed by an RSA 3.0 (often styled as “Mobile Incentive Agreements” or “MIAs”), as depicted in Exhibit 55 below.

#### Exhibit 55



*Source:* Google, “Android Commercial Agreements,” October 2020, GOOG-PLAY-011057832-886, at 845.

395. Additionally, as depicted in Exhibit 56 below, a September 2020 document states that “OEMs have been launching a majority of RSA devices on the premier tier,” thereby indicating that the share of Android smart mobile devices subject to premier tier requirements is increasing. Moreover, this slide shows that certain developers launch a large majority of their devices as premier tier devices, including [REDACTED].<sup>820</sup> Additionally, this document

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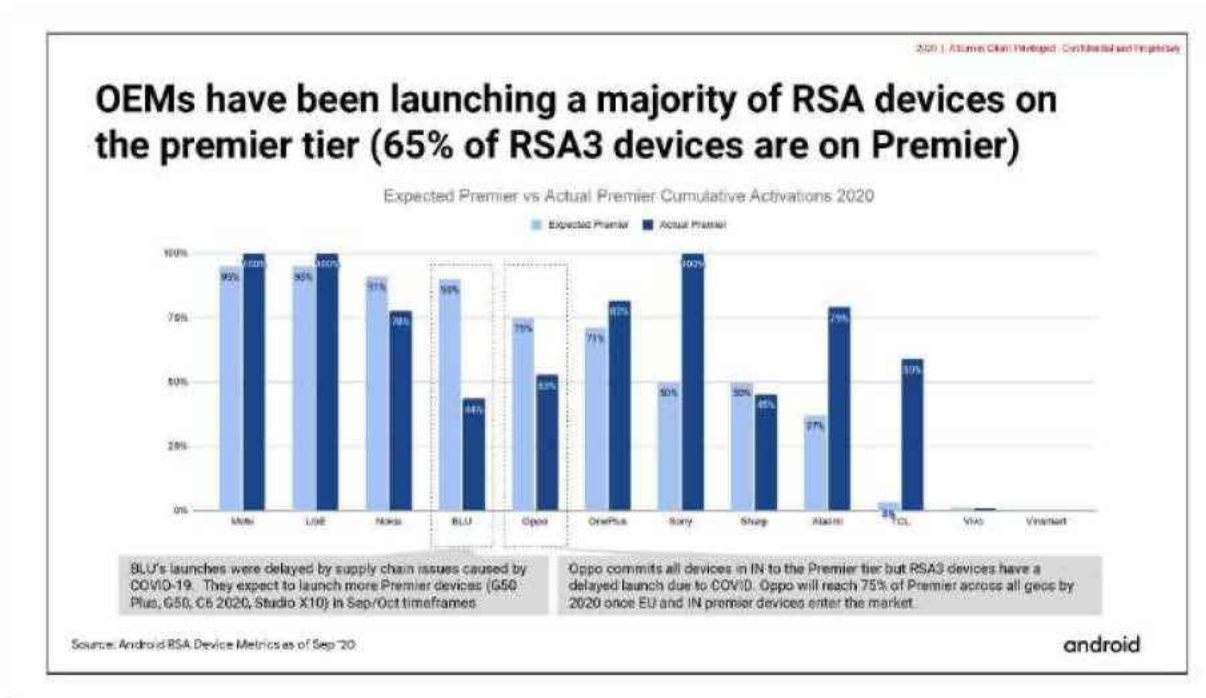
<sup>819</sup> Google, “P&E Partnerships Ops Meeting Bi-weekly,” February 24, 2021, GOOG-PLAY-003894142.R-177.R, at 176.R (Google notes the U.S. “has strong carrier influence and will be addressed by carrier RSA”).

<sup>820</sup> “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R, at 560.R. *See also* GOOG-PLAY-006861555.R, at 560.R, at 568.



also tracks the growth in Premier Tier device activations and shows that OEMs have annual activation commitments and Google has activation targets.<sup>821</sup> Further, [REDACTED] of devices on Premier exceed current partner commitment.”<sup>822</sup>

**Exhibit 56**  
**Majority of New RSA Devices are Premier Tier**



Source: OEM RSA3 Program Review, October 2020, GOOG-PLAY-006861555.R, at 560.R.

396. In Exhibit 57 below, I summarize the RSA 3.0 agreements Google has executed with OEMs.

<sup>821</sup> “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R, at 561.R.

<sup>822</sup> “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R, at 568.R.

**Exhibit 57**  
**Google's RSA 3.0 Agreements with OEMs**

Entity	Type	Date	Play	
			Exclusivity	Clauses
Blu Products	RSA	4/1/2020	Y	PDPR/Attachment C default/DHS
HMD Global	RSA	12/1/2019	Y	5.1(d)/Attachment C
Huawei	RSA	3/1/2020	N	No reference to Google Play
LGE	MIA	4/1/2020	Y*	Attachment D, Exception for company and carrier app stores
Mobicel	RSA	7/1/2020	Y	6.1, 6.2/PDPR
Motorola	MIA	2/1/2020	Y*	Attachment D, Exception for company and carrier app stores
OnePlus	RSA	2/1/2020	Y	Exclusivity built into Addendum A and C
Oppo	RSA	3/1/2020	Y	PDPR/Attachment D default/DHS
Optus Mobile	RSA	4/1/2021	Y	PDPR
Positivo Tecnologia	RSA	3/1/2020	Y	PDPR
Sharp	RSA	4/1/2020	Y	6.1, 6.2/PDPR/Attachment D
Sony	RSA	4/1/2020	Y	PDPR/Attachment D default/DHS
TCL	RSA	4/1/2020	Y	PDPR
Transsion	RSA	9/1/2020	N	No reference to Google Play
Wiko/Tinno Wireless	RSA	4/1/2020	Y	PDPR/Attachment C default/DHS
Vinsmart	RSA	3/1/2020	Y	Attachment D, as set out in PDPR
Vivo	RSA	3/1/2020	Y	Attachments A and D
Vodafone	RSA	4/1/2021	Y	PDPR
Xiaomi	RSA	3/1/2020	Y	PDPR/Attachment D default/DHS
Xiaomi	RSA Am. 2	3/1/2020	Y	PDPR

*Notes:*

1. PDPR is the Premier Device Program Requirements, which require preloading of all GMS Core and Flexible Applications. *See* Exhibit 63.
2. All RSA 3.0 agreements listed were fully executed.
3. OEMs listed as Y\* in Play Exclusivity are those OEMs for which an exception exists only for that OEM's own app store.

*Sources:* GOOG-PLAY-005706676; GOOG-PLAY-000620282; GOOG-PLAY-001745664; GOOG-PLAY-005706338; LGEUS-DOJ-0085240; GOOG-PLAY-005706894; MOTO-NDCAL-00108176; GOOG-PLAY-008111867; GOOG-PLAY-000416651; GOOG-PLAY-001745614; GOOG-PLAY-007038477; GOOG-PLAY-000620442; GOOG-PLAY-000416708; GOOG-PLAY-005706436; GOOG-PLAY-000620478; GOOG-PLAY-000620770; GOOG-PLAY-000620814; GOOG-PLAY-005706728; GOOG-PLAY-000620131; GOOG-PLAY-000620210; GOOG-PLAY-007038511; GOOG-PLAY-000620638; GOOG-PLAY-000620837; and GOOG-PLAY-011120406.

397. Therefore, because Google's RSA 3.0 agreements are over time covering more OEMs, and OEMs are including an increasing majority of their devices on the premier tier, I calculate the share of Android smart mobile device sales subject to RSA 3.0 agreements as a measure of Google's ability to exclude rival app stores. Using data from IDC on smartphone sales, I calculate, for each OEM with an RSA 3.0 agreement with Google, its share of overall Android smartphone sales during 2020-2021. As depicted in Exhibit 58 below, I estimate that approximately

40.6% to 44.6% of Android smart device sales worldwide excluding China were subject to RSA 3.0 agreements during 2020-2021.

**Exhibit 58**  
**Share of Android Smartphone Device Sales Under RSA 3.0 Agreements**  
**Worldwide (Excluding China), 2020 – 2021**

<b>Company</b>	<b>Share of Sales</b>	
	<b>2020</b>	<b>2021</b>
Xiaomi	13.9%	16.6%
OPPO	6.9%	7.9%
vivo	6.9%	6.8%
Lenovo	4.3%	6.0%
LG Electronics	3.1%	1.0%
TCL	1.6%	1.9%
HMD	1.0%	1.2%
OnePlus	0.7%	1.2%
Sharp	0.5%	0.5%
Sony	0.4%	0.4%
BLU	0.4%	0.3%
Wiko	0.4%	0.3%
Mobicel	0.3%	0.1%
Positivo	0.1%	0.1%
Vodafone	0.1%	0.0%
Optus	0.0%	0.0%
<b>Total RSA 3.0 OEMs</b>	<b>40.6%</b>	<b>44.6%</b>

*Notes:*

1. RSA 3.0 OEMs are those for which RSA 3.0 contracts could be identified and confirmed.
2. Excludes Google devices from total Android smartphone device sales.
3. Excludes Huawei and Transsion, RSA 3.0 OEMs for which no Play exclusivity was identified.

*Sources:*

1. IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.
2. Exhibit 57.

398. Additionally, I also estimate the share of Android smart device sales in the U.S. for OEMs with RSA 3.0 agreements. As shown in Exhibit 59 below, I estimate that approximately 40.2% to 46.0% of Android smartphone device sales in the U.S. were subject to RSA 3.0 agreements during 2020-2021.

**Exhibit 59**  
**Share of Android Smartphone Device Sales Under RSA 3.0 Agreements**  
**United States, 2020 – 2021**

Company	Share of Sales	
	2020	2021
	11.9%	17.6%
	19.2%	5.1%
	8.8%	9.0%
	1.1%	3.6%
	1.9%	2.3%
	1.9%	1.3%
	1.0%	1.1%
	0.2%	0.2%
	0.1%	0.0%
<b>Total RSA 3.0 OEMs</b>	<b>46.0%</b>	<b>40.2%</b>

*Notes:*

1. RSA 3.0 OEMs are those for which RSA 3.0 contracts could be identified and confirmed.
2. Excludes Google devices from total Android smartphone sales.
3. Excludes [REDACTED] an RSA 3.0 OEM for which no Play exclusivity was identified.

*Sources:*

1. IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.
2. Exhibit 57.

399. Finally, due to the impact of indirect network effects, I find these shares likely do not fully reflect the market dynamics and competitive opportunities available to alternative Android app stores. When an alternative Android app store is unable to reach consumers through OEM pre-installation or distribution through an OEM app store, that alternative app store reaches fewer Android smart device users. Fewer Android smart device customers using that alternative Android app store attracts fewer developers to the store; with fewer developers and the apps they distribute on the store, the few customers are attracted to the store, and so on. Therefore, foreclosure on one side implies a reciprocal foreclosure on the other side, and, thus, the foreclosure is magnified due to

indirect network effects and the virtuous cycle described in Section V.A.2 above becomes a vicious cycle.<sup>823</sup>

b) Google's Offers to Samsung to Neutralize It as a Competitive Threat

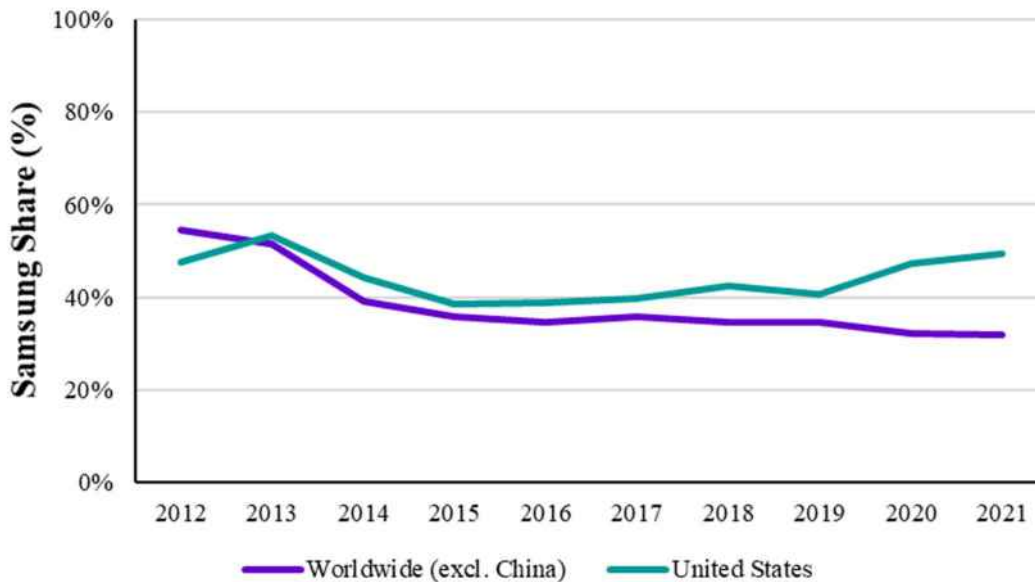
400. Google materials state that Samsung posed the greatest threat to its Android App Distribution monopoly since it was “the only OEM with sufficient share to plausibly build its own store in key Play markets.”<sup>824</sup> Indeed, according to data from IDC, during the period 2012 to 2021, Samsung's share of device sales ranged from 39% to 53% in the U.S. and 32% to 54% worldwide excluding China (see Exhibit 60). The next largest Android OEM during the same period was LG in the U.S., with a peak share of 24% during the same period, and Xiaomi worldwide excluding China with a peak share of 17% in 2021.

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<sup>823</sup> I do not have data or agreements after 2020 that indicate the number of premier tier devices sold worldwide or in the United States. I reserve the right to modify these calculations and present premier tier devices subject to exclusivity clauses as a percentage of worldwide and U.S. Android smart mobile device sales.

<sup>824</sup> Vu, Linda, Brian Brazinski, Josh O'Connor, Shafiq Ahmed, “Project Hug: Risk & Leakage Model,” Google, February, 2018, GOOG-PLAY-000005203.R-312.R, at 216.R.

**Exhibit 60**  
**Samsung's Share of Android Smartphone Devices, 2012 – 2021**



*Source:* IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022.

401. Google documents reflect concern about competition from the Galaxy Store. A 2016 summary of a proposed “Launcher Deal” with Samsung noted that “What Play wants from Samsung” is “[n]ot invest in app distribution through the Galaxy App store,” and for Samsung to instead “use Play as the exclusive app distribution outlet.”<sup>825</sup>

402. Google had good reason to view Samsung as a threat to its Android-app-distribution monopoly: In 2018, Samsung allowed Epic Games to launch Fortnite exclusively on the Samsung Galaxy Store.<sup>826</sup> To deter the Galaxy Store from competing with Google Play Store, Google devised Project Banyan, a proposal to Samsung that included product and commercial offers. In an email discussing Project Banyan, Google officials expressed concerns that Samsung could have a disruptive revenue share model that would make them more attractive to developers and implied it

<sup>825</sup> Google, “Samsung Launcher Deal options,” GOOG-PLAY-001267046.

<sup>826</sup> Webster, Andrew and Chris Welch, “Fortnite for Android is launching today exclusively on recent Samsung Galaxy device,” August 9, 2018, available at <https://www.theverge.com/2018/8/9/17666316/samsung-galaxy-note-9-fortnite-android-release-unpacked-event-2018>.

may not be in Google's interest to offer 30% RSA to Samsung like they would for other carriers, as they could utilize it to drive down the revenue share for their developers.<sup>827</sup> Google offered cash payments, revenue share, and marketing aid in exchange for the Galaxy Store serving as a "partner for delivering games from Play Store."<sup>828</sup> Since apps would be "hosted and delivered by Play," this proposal also implied that the Galaxy Store would use Google Play Billing as the in-app billing module: "The proposal essentially was that, to the extent that Samsung had an interface or an experience that they called the Galaxy Store and they promoted and merchandised apps or content, that content, those apps, would be fulfilled by the Play Store's back end which . . . would be the billing system for those apps."<sup>829</sup>

403. Specifically, Google's proposal requested:<sup>830</sup>

- "Google Play Store to host all Android app APKs that are distributed through Galaxy Store or any other Company app which distributes APKs (excludes non-mobile / non – Android)."
- "Google to provide all billing, security, and app updates through the Google Play Store infrastructure."
- "No 3P app stores to be placed on the Default Home Screen."
- "No 3P app stores to be linked to any Assistive services on device."

404. In exchange for adhering to these requirements, Google offered Samsung \$50 million per year [REDACTED] amounting to [REDACTED]

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<sup>827</sup> Email from Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, to Erin Crosby, Google, Sameer Samat, VP of Product Management at Google, "Subject: Re: Banyan," June 12, 2019, GOOG-PLAY-001877016.C-022C, at 018.C and Email from Jamie Rosenberg, Vice President of Strategy and Operations (Platforms and Ecosystems Division) at Google, to Erin Crosby, Google, Sameer Samat, VP of Product Management at Google "Subject: Re: Banyan," June 11, 2019, GOOG-PLAY-001877016.C-022.C, at 020.C

<sup>828</sup> Google, "Play Monthly," March 2019, GOOG-PLAY-004508753.R-851.R, at 765.R.

<sup>829</sup> Rosenberg (Google) Deposition, pp. 99-100.

<sup>830</sup> Google, "Samsung + Google Building unique app experiences for Samsung devices and users," April 26, 2019, GOOG-PLAY-007246367-395, at 395.



██████████.<sup>831</sup> Google representatives presented the Banyan offer to Samsung at an in-person meeting at Samsung's Seoul headquarters during the week of June 10, 2019.<sup>832</sup>

405. Samsung followed up with a counterproposal, delivered to Google in a document titled, "Google-Samsung Store Agreement Term Sheet," on June 20.<sup>833</sup> The first bullet term at the top of Samsung's term sheet described the "[g]oal" of the deal as "[p]revent[ing] unnecessary competition on store."<sup>834</sup> Under the Samsung version of the Project Banyan agreement, Samsung would be prevented from distributing third-party apps/gamer installers via the Galaxy Store, but it would be allowed to "curate, show and distribute all apps on Play Store."<sup>835</sup> Samsung Pay was also to be included as an option within Google Play Billing, and Google Play Billing's user interface would be customized to fit with the Samsung Galaxy Store's design.<sup>836</sup> As an incentive for Samsung to agree to these terms, Google would pay Samsung a revenue share of ██████████ on Google's revenue generated from the Galaxy Store, plus a \$50m/year payment ██████████.<sup>837</sup>

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<sup>831</sup> Google, "Samsung + Google Building unique app experiences for Samsung devices and users," April 26, 2019, GOOG-PLAY-007246367-395, at 392.

<sup>832</sup> Email from Jay Kim, Samsung, to Jim Kolotouros, Vice President, Android Platform Partnerships at Google, Christopher Li, Director and Head of Product Growth at Google, Seung Song, Samsung, "Subject: Store Collaboration," June 20, 2019, GOOG-PLAY4-004259429 (June 20, 2019 email from Jay Kim (Samsung) to Jim Kolotouros et al. "thank[ing] [Google] for making a quick trip to Korea last week" and attaching term sheet for Samsung's counter).

<sup>833</sup> Email from Jay Kim, Samsung, to Jim Kolotouros, Vice President, Android Platform Partnerships at Google, Christopher Li, Director and Head of Product Growth at Google, Seung Song, Samsung, "Subject: Store Collaboration," June 20, 2019, GOOG-PLAY4-004259429 and Google, "Google-Samsung Store Agreement Term Sheet," June 20, 2019, GOOG-PLAY4-004259430(attachment).

<sup>834</sup> Google, "Google-Samsung Store Agreement Term Sheet," June 20, 2019, GOOG-PLAY4-004259430; Kolotouros (Google) Deposition, p. 470 ("Samsung's interpretation of the goal of the collaboration was to prevent unnecessary competition."); and Rosenberg (Google) Deposition, p. 118 (confirming that Patrick Chomet of Samsung interpreted the ██████████ Banyan proposal as a suggestion that Samsung "get out of the store business").

<sup>835</sup> Google, "Google-Samsung Store Agreement Term Sheet," June 20, 2019, GOOG-PLAY4-004259430, at 430.

<sup>836</sup> Google, "Google-Samsung Store Agreement Term Sheet," June 20, 2019, GOOG-PLAY4-004259430, at 431.

<sup>837</sup> Google, "Google-Samsung Store Agreement Term Sheet," June 20, 2019, GOOG-PLAY4-004259430, at 432.

406. Google VP Jim Kolotouros testified that Google, after consulting with in-house attorneys, “thought it best to suspend the conversation.”<sup>838</sup> Google abandoned Project Banyan and related work streams on July 11, 2019.<sup>839</sup>

407. Although Google apparently intended its rejection of Samsung’s counterproposal to be final, and terminated Project Banyan at the same time, Samsung continued to seek further counterproposals from Google.<sup>840</sup> Finally, in 2020, Google then entered another RSA with Samsung, which does not contain a Play Store exclusivity provision.<sup>841</sup> Google CFO Ruth Porat testified that she is unaware of any agreement between Google and Samsung besides that RSA and the MADA.<sup>842</sup>

c) Google Restricted Competition from Third-Party App Stores Through Mobile App Distribution Agreements with OEMs

408. As explained in Section IV, the MADAs Google executed with nearly all OEMs have three features that further frustrated competing Android app stores’ efforts to compete meaningfully with Android Market and, later, the Google Play Store: (1) home screen placement requirements for the Google Play icon on the device user interface and, in some agreements, parity requirements that no competing app store icon may have more prominent placement than Google Play, along with requirements that Play be set as the “default” app for app installation; (2) requirements that OEMs install Play on their devices if they wish to install any other core GMS app, including Google’s marquee Gmail, Maps, Search, and YouTube apps; and (3) requirements that

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<sup>838</sup> Kolotouros (Google) Deposition, p. 383.

<sup>839</sup> Email from Jamie Rosenberg, Vice President of Strategy and Operations (Platforms and Ecosystems Division) at Google, to Google Personnel, “Subject: Project Banyan Update,” July 11, 2019, GOOG-PLAY-003720093 and *see* GOOG-PLAY-001059135 (“Working P&L” spreadsheet; note on cell K52 in which Cyrus Jame asks “did we drop Banyan?” and Jourdan Halath answers, “Yes, Banyan is not loaded for 2020”); and Google, “Samsung Update,” July, 2019, GOOG-PLAY-001183163.R-188.R, at 166.R (“Google officially rejected Samsung proposal presented in Hong Kong” and that Google personnel had been informed “that [the] Banyan effort has been discontinued”).

<sup>840</sup> Rosenberg (Google) Deposition, p. 125.

<sup>841</sup> Google and Samsung, “Google Mobile RSA,” July 1, 2020, GOOG-PLAY-003604372-410, at 372.

<sup>842</sup> Porat (Google) Deposition, p. 169 (“Q. Okay. Besides the RSA and the MADA, are you aware of any current contracts between Google and Samsung pertaining to app stores? A. I am not.”).

mobile devices with GMS apps comply with the CDD and pass the CTS, which limit consumers' ability to sideload apps, as discussed in the next section.

(1) The MADAs' home-screen placement requirements

409. From the launch of Android Market, Google has required OEMs to agree to preference its app store (whether Android Market or the Play Store) on their Android device screens. The placement requirements in the MADA have changed over time, as summarized immediately below in Exhibit 61. A full summary of all MADAs executed with leading OEMs beginning in 2009 is included as Appendix D.

**Exhibit 61**  
**Google Play Store Home Screen Placement Requirements in Google's MADAs**

MADA Execution		
Date	Google Play Store Placement Requirement	Home Screen Definition
2009	"3(d) Placement Requirements: Unless otherwise approved by Google in writing; (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone Top Search and Android Market Client must be on the Device phone top; and (3) other Google Applications will be placed no more than one menu below the phone top."	"Phone Top" not a defined term
2011-2013	"3.4. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen"	"1.7. 'Default Home Screen' means the default display of a Device, prior to any changes made by End Users, that appears without scrolling in both portrait and landscape modes when the Device is in active idle mode (i.e. not in sleep mode)."
2013-2017	"3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will [or will ensure that 3PL will]: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded 'Google' that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon..."	"1.1(i) 'Default Home Screen' means the default display of a Device, prior to any changes made by End Users, that appears without scrolling in both portrait and landscape modes when the Device is in active idle mode (i.e. not in sleep mode)." "1.1(p) 'Home Screen' means with respect to the default navigation hierarchy of a Device UI, the top-most level screen from which applications can be launched by an End User."
2017 - present	"4.4 Placement Requirements; Device Setup... Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded 'Google' that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing)."	"1.14 'Default Home Screen' means the default display of a Device, including the lock screen and/or the notification tray, prior to any changes made by End Users that appears without scrolling (i) after initial boot-up, (ii) after each subsequent power-up, or (iii) after an End User selects the 'home' icon."

NON-PARTY AND PARTY HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY

*Sources:*

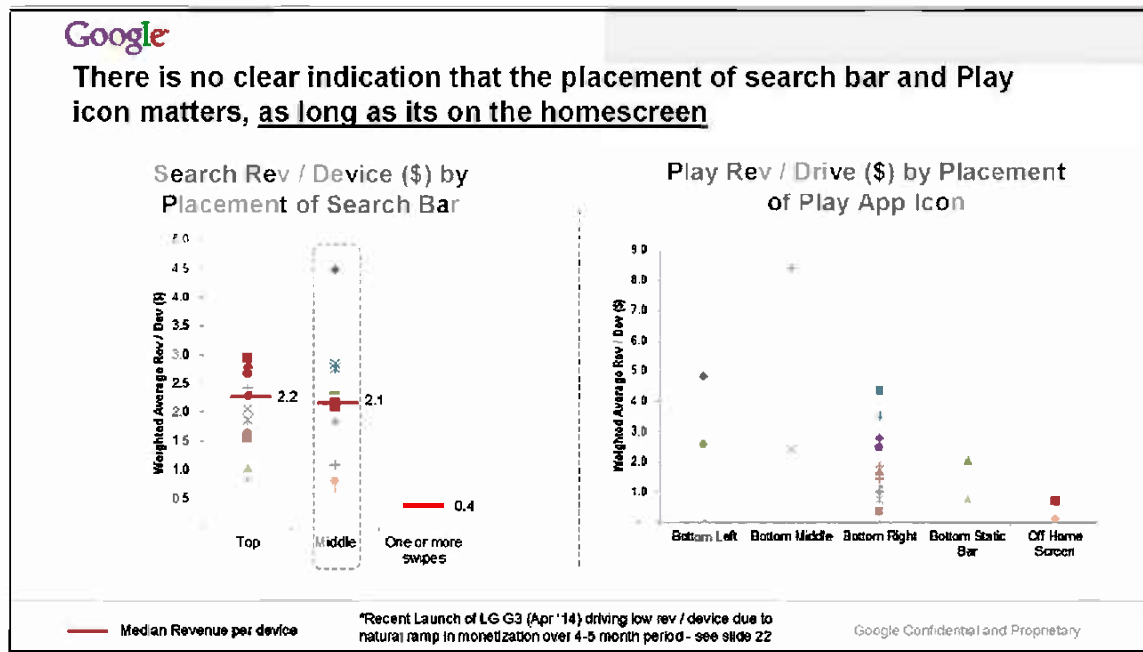
1. Google and ASUSTek Computer Inc., “MADA (Android),” November 1, 2009, GOOG-PLAY-001477713-726, at 717; Google and Kyocera, “MADA (Android),” October 1, 2009, GOOG-PLAY-000621075-084, at 078. The contract language varies slightly across certain agreements. See, e.g., Google and Huawei, “MADA (Android),” June 1, 2009, GOOG-PLAY-001745969-981, at 978.
2. Google and ASUSTek Computer Inc., “MADA (Android),” January 1, 2012, GOOG-PLAY-000617360-371, at 363 and 361; Google and Huawei, “MADA (Android),” January 1, 2011, GOOG-PLAY-000857382-393, at 385-386 and 383; Google and LGE, “MADA (Android),” January 1, 2011, GOOG-PLAY-000621085-096, at 086 and 088; and Google and Sharp, “MADA (Android),” December 1, 2011, GOOG-PLAY-000416789-800, at 790 and 792. The contract language varies slightly across certain agreements. See, e.g., Google and Lenovo, “MADA (Android),” July 1, 2012, GOOG-PLAY-001089608-619, at 611 and 609.
3. Google and ASUSTek Computer Inc., “MADA,” March 1, 2014, GOOG-PLAY-000617555-576, at 557-558 and 561-562; Google and HTC, “MADA,” March 1, 2014, GOOG-PLAY-000617577-592, at 578-579 and 582; Google and Huawei, “MADA,” May 1, 2016, GOOG-PLAY-007981395-410, at 396-397 and 400; Google and Kyocera, “MADA,” July 1, 2013, GOOG-PLAY-000617505-521, at 506-507 and 510; Google and Lava, “3PL MADA,” November 1, 2014, GOOG-PLAY-000617749-766, at 750-751 and 755 [only Google Play Store Placement Requirement]; Google and OnePlus, “MADA,” April 1, 2014, GOOG-PLAY-000416327-341, at 328-329 and 331-332; Google and OPPO, “3PL MADA,” April 1, 2015, GOOG-PLAY-000416373-392, at 374-375 and 380; and Google and Transsion Investment Limited, “3PL MADA,” February 1, 2015, GOOG-PLAY-000617778-797, at 780-781 and 785-786.
4. Google and [REDACTED] “MADA,” October 1, 2017, GOOG-PLAY-000618885-910, at 887 and 893-894; Google and [REDACTED] “MADA,” August 1, 2017, GOOG-PLAY-000618863-884, at 865 and 871; Google and [REDACTED] “MADA,” November 1, 2017, GOOG-PLAY-009640439-467, at 442 and 450; Google and [REDACTED] “MADA,” July 1, 2017, GOOG-PLAY-000618559-581, at 561-562 and 567-568; Google and [REDACTED] “MADA,” July 1, 2017, GOOG-PLAY-000618749-771, at 752 and 758; Google and [REDACTED] “MADA,” July 1, 2017, GOOG-PLAY-000618341-363, at 344 and 350; Google and [REDACTED] “MADA,” August 1, 2017, GOOG-PLAY-000416477-497, at 479 and 485; Google and [REDACTED] “MADA,” September 1, 2017, GOOG-PLAY-000416454-476, at 456-457 and 462-463. The contract language varies slightly across certain agreements. See, e.g., Google and [REDACTED] “MADA,” October 1, 2017, GOOG-PLAY2-000456929-966, at 933 and 942.

410. As reflected in the above chart and the supporting documents, over time, the MADA placement requirements became more stringent. As shown above, in the agreements executed in the 2011-2013 period, OEMs who wished to license GMS apps could preload the Play Store icon one swipe away from the default home screen, but the later MADAs (2013 and after) required that the Play Store icon be installed on the default home screen itself.

411. Google’s own research showed that default home screen placement for its apps drove significantly more usage and revenue than placement one swipe or more away. An analysis of 2010 data studying Google Search widget placement on Android smart mobile devices found that “centre

panel placement drives 3x more traffic than adjacent panel” placement.<sup>843</sup> A 2015 Google analysis found that placement of the search widget and Play Store icon one or more swipes away from the home screen generated less median revenue per device, as depicted in Exhibit 62.<sup>844</sup>

**Exhibit 62**  
**Home Screen Placement Drives Usage and Revenue**



Source: Google, “Android BD Overview,” March 2015, GOOG-PLAY4-002369232-252, at 247.

412. Although OEMs and carriers regard “home/home placement as the holy grail” and have “requested flexibility on the placement of search and Google Play,”<sup>845</sup> Google executives insist on prominent placement of its Play Store icon. For example, Ben Serridge, Director of

<sup>843</sup> Email from Garry McCollum, Google, to Marcos Steverlynck, Google, “Subject: Re: Android Serach [sic] Usage by Device,” July 12, 2010, GOOG-PLAY-010939023-025, at 023, and attachment, Marcos Steverlynck, “GOOG-PLAY-010939026\_CONFIDENTIAL.xls,” July 12, 2010, GOOG-PLAY-010939026.

<sup>844</sup> Google, “Android BD Overview,” March, 2015, GOOG-PLAY4-002369232-252, at 247 and Gold (Google) Deposition, pp. 153-154 (“Q. What is your understanding of what this graph is illustrating? A. I’m only interpreting it here because I don’t remember, but it looks like it’s some aspect of revenue by where the Play Store would be located – where the Play app icon would be located”).

<sup>845</sup> Email from Tamara Hrivnak, Google, to Natascha Bock, Google, “Subject: Re: Google Play discovery widget?,” April 24, 2015, GOOG-PLAY-000832471-473, at 471. See also Google, “Wireless Carrier Project – BD Team Interview,” September 22, 2014, GOOG-PLAY-007264058-068, at 060.



Product Management at Google, wrote in a 2013 email that Google would “always have the placement / pre-install advantage which is 90% of the battle.”<sup>846</sup> A Google Group Product Manager, Vitor Baccetti, wrote that “from a policy perspective, requiring apps to be placed in the home screen is a mechanism to deter OEMs from preloading a large number of apps.”<sup>847</sup>

413. Google admitted in its submission to the European Commission in connection with its investigation of Android that “[p]re-loading these apps and placing Search on the home screen is unquestionably valuable to Google.”<sup>848</sup> For example, Google’s competitive assessment of the Amazon App Store noted that Play Store would have an advantage over the Amazon Appstore because, under the MADAs, OEMs would give preferential “home screen placement” to Google’s “Search, Apps, [and] Play Store” icons.<sup>849</sup> Amazon told the European Commission “that premium placement has as much as twice the user adoption compared to the same application with a non-premium placement.”<sup>850</sup>

414. Even where Google permitted OEMs or carriers to preload their own app store on the mobile device home screen, Google negotiated “parity” provisions in the MADAs requiring that those stores receive no more prominent placement than the Play Store in MADAs executed between 2017 and 2020 before removing those provisions from future agreements.<sup>851</sup>

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<sup>846</sup> Email from Ben Serridge, Director of Product Management at Google, to Jonathan Zepp, Google, “Subject Re: [REDACTED] app,” June 06, 2019, GOOG-PLAY-006355073-074, at 073.

<sup>847</sup> Email from Vitor Baccetti, Google, to Andy Abramson, Google, “Subject: Re: PAI: Samsung raising Requiring all apps to be placed in the home screen,” October 20, 2016, GOOG-PLAY-007932523-525, at 523.

<sup>848</sup> EC Decision ¶ 780(1) and ¶ 789(1) (admission by Nokia that “being prominently visible on a smartphone’s home screen or near to the home screen inevitably increases the likelihood of consumers trying out the app.”); and ¶ 789(5) (data from Yandex, a competitor to Google Search and member of the “One Platform Foundation” of third-party app stores showing that its market share jumped when its search icon was placed on the home screen with default permissions as compared to placement on a screen one swipe away).

<sup>849</sup> Google, “Amazon Top Partner Review,” March 17, 2016, GOOG-PLAY-004494298.R-325.R, at 307.R.

<sup>850</sup> Morrill (Amazon) Deposition pp. 145-46.

<sup>851</sup> Google and [REDACTED] “MADA,” October 1, 2017, GOOG-PLAY-000618885-910, at 895; Google and [REDACTED] “MADA,” August 1, 2017, GOOG-PLAY-000618863-884, at 873; and Google and [REDACTED] “MADA,” November 1, 2017, GOOG-PLAY-009640439-467, at 452.

## (2) Google's bundling of GMS apps with the Google Play Store

415. Since 2009, when Android Market launched, Google's MADAs have required any OEM that would like to preload any GMS app (including marquee apps like Gmail, YouTube, or Google Maps) on its devices to preload *all* the mandatory apps, including the Android Market or Google Play Store apps.<sup>852</sup> In addition to the Google apps Google has required OEMs preload under the MADAs, OEMs must also license "Core Services," a set of over 20 APKs and libraries.<sup>853</sup> The number and list of apps OEMs must preload under the MADAs has changed over time, as shown in Exhibit 63 below.

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<sup>852</sup> Brady (Google) Deposition, pp. 201-202 ("Q. And what that means in practice is that an OEM that signs a MADA has no obligation to actually distribute the Google apps licensed under the MADA, but if they distribute any, they must take and distribute all the mandatory ones. Is that right? A. That is correct. With caveats around geographic availability and things like that. But generally yes."); Li (Google) Deposition, p. 194 ("Q. If an OEM would like to pre-install any of the required apps on a device under the terms of the MADA, that OEM must pre-install all of the required apps on that device; correct? A. Yes."); Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Doug Yeum, Google, "Subject: Re: quick question on Market;" April 27, 2010, GOOG-PLAY4-000341393-394, at 393 ("Do you know if our Android team is ever planning to unbundle the apps in GMS and allow partners to pick and choose what Google apps to preload on their devices? [...] Right now it's all or nothing."); and Email from Doug Yeum, Google, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, "Subject: Re: quick question on Market;" April 26, 2010, GOOG-PLAY4-000341393-394, at 393.

<sup>853</sup> Google, "GOOG-PLAY-006334343-GOOG-PLAY-006334343-GOOG-PLAY-006334343\_HIGHLY CONFIDENTIAL - ATTORNEYS' EYES ONLY.xlsx," GOOG-PLAY-006334343, Sheet = "Core Service" (listing AndroidPlatformServices, ConfigUpdater, GmsCore, GoogleBackupTransport, GoogleFeedback, GoogleOneTimeInitializer, GooglePartnerSetup, GoogleRestore, GoogleServicesFramework, SetupWizard, GoogleCalendarSyncAdapter, GoogleContactsSyncAdapter, WebViewgoogle, GoogleTTS, GooglePackageInstaller, GoogleExtServices, GoogleExtShared, GooglePrintRecommendationService, Wildevine DRM, Google Hotword Engine, MapView V1 Library, and Google Media Effects Library as required services and libraries for non-EEA countries).



**Exhibit 63**  
**Mandatory GMS Apps Under Google's MADA**

<b>MADA Execution Date</b>	<b># of Mandatory GMS Apps</b>	<b>List of Mandatory GMS Apps</b>	
2009-2013	12	1. Set-up Wizard 2. Google Phone-top Search 3. Gmail 4. Google Calendar 5. Google Talk 6. YouTube	7. Google Maps for Mobile 8. Google Street View 9. Contact Sync 10. Android Market Client (not products downloaded from Android Market) 11. Google Voice Search and 12. Network Location Provider.
2013-2017	27	1. Google Play Client (does not include products downloaded from Google Play) 2. Calendar Sync 3. Contacts Sync 4. Gmail 5. Google+ (including Google+ Photos) 6. Google Play Books 7. Google Calendar 8. Google Maps 9. Google Play Music 10. Google Partner Setup 11. Google Search (including Google Now) 12. Google Chrome 13. Google Services Framework 14. Google Street View	15. Google Talk 16. Google Play Movies 17. Google Play Newsstand 18. Google Play Games 19. Google Drive 20. Google Backup and Restore 21. Google Voice Search 22. Media Uploader 23. Network Location Provider 24. Set Up Wizard 25. YouTube 26. Google WebView Component and 27. Widevine (requires separate agreement with Google).
2017 - present	11+	1. Google Search 2. Chrome 3. Gmail 4. Maps 5. YouTube 6. Play Store	7. Drive 8. YouTube Music 9. Play Movies 10. Duo 11. Photos

*Notes:*

1. I understand from the Geo-Availability Chart that some Android builds such as Google Go devices require additional preloaded Google apps. For the sake of simplicity and to be conservative I confine my analysis to the requirement to preload the minimum 11 mandatory GMS apps.
2. In certain contracts, Google Play Magazines is a required app in lieu of Google Play Newsstand.

*Sources:*

1. Google and ASUSTeK Computer Inc., "Mobile Application Distribution Agreement (Android)," November 1, 2009, GOOG-PLAY-001477713-726, § 1.10; Google and Shenzhen Huawei Communication Technologies Co., Ltd, "Mobile Application Distribution Agreement (Android)," June 1, 2009, GOOG-PLAY-001745969-981, Exhibit A; and Google and KYOCERA Corporation, "Mobile Application Distribution Agreement (Android)," October 1, 2009, GOOG-PLAY-000621075-084, § 1.10.
2. Google and ASUSTeK Computer Inc., "Mobile Application Distribution Agreement (MADA)," March 1, 2014, GOOG-PLAY-000617555-576, § 1.1(m); Google and HTC Corporation, "Mobile Application Distribution Agreement (MADA)," March 1, 2014, GOOG-PLAY-000617577-592, § 1.1(m); Google and Huawei Device Co., Ltd., "Mobile Application Distribution Agreement (MADA)," May 1, 2014, GOOG-PLAY-007981395-410, § 1.1(m); Google and KYOCERA Corporation, "Mobile Application Distribution Agreement (MADA)," March 1, 2014, GOOG-PLAY-000617505-521, § 1.1(m); Google and Lava International Ltd, "3PL Mobile Application Distribution Agreement (MADA)," November 1, 2014, GOOG-PLAY-000617749-766, § 1.1(m); Google and

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OnePlus Technology Limited, “Mobile Application Distribution Agreement (MADA),” April 1, 2014, GOOG-PLAY-000416327-341, § 1.1(m); Google and OPPO Telecommunications Corp., Ltd, “3PL Mobile Application Distribution Agreement (MADA),” April 1, 2015, GOOG-PLAY-000416373-392, § 1.1(m); and Google and Transsion Investment Limited, “3PL Mobile Application Distribution Agreement (MADA),” February 1, 2015, GOOG-PLAY-000617778-797, § 1.1(m).

3. Google, “Geo-Availability Chart,” December 7, 2020, GOOG-PLAY-006334343, Sheet = “Regular GMS Apps;” see also Email from [REDACTED] to Eric Christensen, Executive Director of Software Product Management and Partner Management at [REDACTED], “Subject Re: GMS required apps,” October 28, 2020, [REDACTED] 00142728-730.

416. OEMs demand these Google apps so their Android mobile devices can have basic functionality like navigation, search, and web browsing.<sup>854</sup> As one Google executive testified, “Android with GMS” is “a much more compelling product” than Android alone.<sup>855</sup>

417. The bundling of GMS apps with the Play Store works in concert with the home-screen placement requirement. An OEM might want to preload both YouTube, Google’s extremely popular video streaming app, and a third-party app store on its Android smart mobile device. But to preload YouTube, an OEM (i) must also install the Play Store on the default home screen, where it will generate more revenue for Google, and (ii) may not put a third-party store in any more favorable position than the Google Play icon.

418. OEMs also need to pre-load GMS in order ensure that many third-party apps will work. For example, the Google Play Services API Fused Location Provider allows developers to choose the level of precision desired to determine device location: “For example, you can request the most accurate data available, or the best accuracy possible with no additional power consumption.”<sup>856</sup> Google states that the work to determine location with a given level of precision

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<sup>854</sup> Brady (Google) Deposition, p. 45 (“Q. Why did you believe that Android with GMS was a much more compelling product than just Android? A. [. . .] You know Google Search, Google Maps, YouTube, et cetera, were very popular products at the time. And so . . . users found them compelling. And our partners then wanted to distribute them.”) and Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Wireless Biz, “Subject: [Wirelessbiz] Re: Android Deployments and Partner Inquiries,” October 13, 2008, GOOG-PLAY-008471716, at 717 (“Most partners don’t just want Android for Android, they want Android with GMS because this a much more compelling product”).

<sup>855</sup> Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Wireless Biz, “Subject: [Wirelessbiz] Re: Android Deployments and Partner Inquiries,” October 13, 2008, GOOG-PLAY-008471716, at 717.

<sup>856</sup> Google, “Simple, battery-efficient location API for Android,” available at <https://developers.google.com/location-context/fused-location-provider>.

is “challenging” without Fused Location Provider, as this API “removes the guesswork by automatically changing the appropriate system settings.”<sup>857</sup> A variety of popular third-party apps, including for ridesharing and food delivery, must integrate with location APIs to provide geolocation functionality. Google estimated in 2019 that “826 out of the top 1000 Android apps” call on GMS APIs to function.<sup>858</sup>

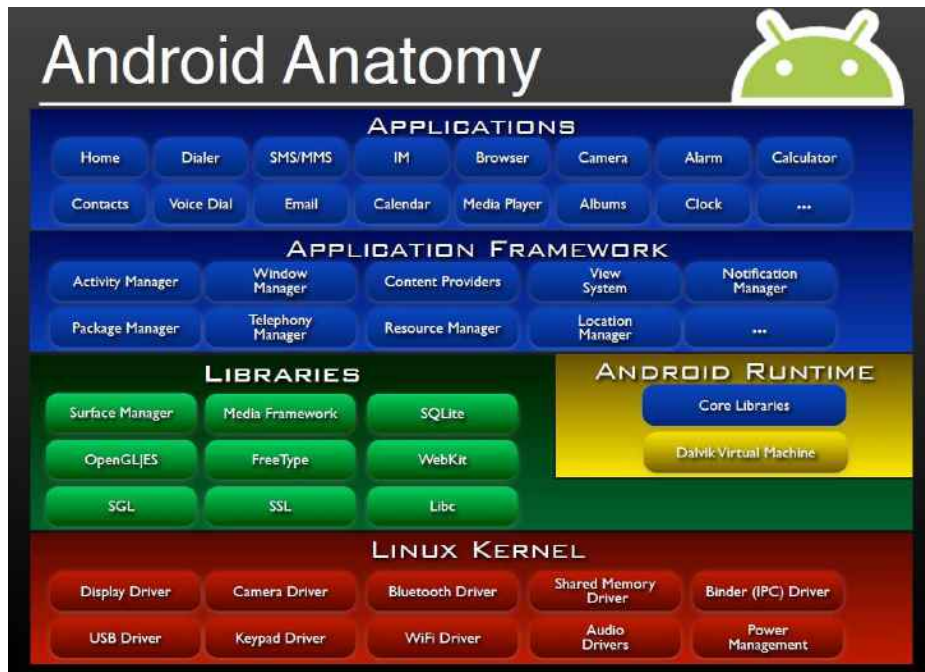
419. Google engineered OEMs’ reliance on GMS. Before the original open-source Android was released, Google marketed it as including a host of open-source apps, including text and instant messaging, a browser, and an email app, as depicted in Exhibit 64 below.

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<sup>857</sup> Google, “Simple, battery-efficient location API for Android,” available at <https://developers.google.com/location-context/fused-location-provider>.

<sup>858</sup> PX647; Android Global Business team, Google, “Android 101,” May 2019, GOOG-PLAY-000128863.R-908.R, at 876.R (stating that “826 of the top 1000 Android apps use 1 or more GMS Core APIs (Facebook, WhatsApp, Twitter, and many other apps”) and Kolotouros Deposition, p. 448 (“Q. So, understanding that many developers utilize -- elect to utilize Google Play services that APIs and utilities make their apps better, it's fair to say that according to this slide, 826 out of the top thousand Android apps used one or more GMS core APIs; is that correct? A. Yes, I see that on the slide, yes”).

**Exhibit 64**  
**Google Marketing of Android Apps as Open Source<sup>859</sup>**



*Source:* Brady, Patrick, “Android Anatomy and Physiology,” Google, available at <https://sites.google.com/site/io/anatomy--physiology-of-an-android>.

420. Over time, however, Google stopped updating or removed functionality from open-source Android apps. For example, in 2011, Google was planning to release a version of its Chrome browser for Android. It decided to make the “browser app” on open-source Android “closed source” because it uses “Google services (bookmark sync, tab sync, device-to-device, autofill, etc).”<sup>860</sup> A Google engineer, Dan Morrill, voiced his concerns, noting his extreme displeasure at Google’s “one-by-one closing of the apps” strategy.<sup>861</sup>

<sup>859</sup> Brady, Patrick, “Android Anatomy and Physiology,” Google, available at <https://sites.google.com/site/io/anatomy--physiology-of-an-android> and Brady (Google) Deposition, p. 321 (“Q. And when open-source Android was initially released, there was a fully functioning open-source browser app available with the operating system. Right? A. That’s correct”).

<sup>860</sup> Email from Dave Burke, Google, to Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, “Subject Re: Clank,” October 19, 2011, GOOG-PLAY4-000821936-940, at 938.

<sup>861</sup> Email from Dan Morrill, Google, to Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, “Subject Re: Clank,” October 19, 2011, GOOG-PLAY4-000821936-940, at 937-38.

421. Google released the Chrome browser for Android in February 2012.<sup>862</sup> In April 2012, Google was considering whether and how to include Chrome in GMS. Initially, Patrick Brady proposed not making Chrome a mandatory app because of storage concerns on lower end devices with limited capacity, but co-founder and director of Android Andy Rubin ordered that Chrome become a mandatory app because “[t]he solution to making a great Google product isn’t to make our technology optional!!”<sup>863</sup> Chrome then became a mandatory GMS app in 2012.<sup>864</sup>

422. Around the same time Google was making Chrome a mandatory GMS app, it was phasing out its support for the open-source Android browser. In response to a 2014 press inquiry about a bug in the open-source Android browser app that Google determined internally it would not fix,<sup>865</sup> Android head Hiroshi Lockheimer explained in correspondence to other Google executives that “the AOSP browser is something that isn’t getting much attention.”<sup>866</sup> Google had stopped supporting the Android browser before publicly announcing that it would only support Chrome going forward.<sup>867</sup> By 2015, a Google presentation, as reproduced in Exhibit 65 below, noted that the

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<sup>862</sup> Swift, Mike, “Google launches Chrome browser for Android smartphones,” *Phys.Org*, February 9, 2012, available at <https://phys.org/news/2012-02-google-chrome-browser-android-smartphones.html>.

<sup>863</sup> Email from Andy Rubin, Former Google VP and Android Founder, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, “Subject: Re: Chrome in GMS,” April 18, 2012, GOOG-PLAY-001449657 and Brady (Google) Deposition, pp. 322-326.

<sup>864</sup> Brady (Google) Deposition, pp. 327-328 (“Q. And did Chrome end up becoming a mandatory or core app in Google Mobile Services? A. It did.”) and Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Srikanth Rajagopalan, Google, “Subject: Re: Chrome in GMS,” June 18, 2012, GOOG-PLAY-001460686-692, at 686 (“The plan is to make Chrome mandatory for new (not upgraded) devices, but we’ll be giving some amount of grace period (~8 weeks) b/c we can’t stop devices in the launch pipeline”).

<sup>865</sup> Email from Jon Larimer, Google, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, Selim Gurun, Google, “Subject: Re: responding to Android Browser bugs,” January 23, 2014, GOOG-PLAY4-001703880-885, at 884 (“How do we respond to bug reports in the Android browser? Here is a case from someone reporting the content sniffing bug that already closed out and marked ‘won’t fix’ internally”) and Brady (Google) Deposition, p. 330 (“Q. That phrase ‘won’t fix,’ does that mean that Google has made a determination that it would not, in fact, fix that bug? That’s correct”).

<sup>866</sup> Email from Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, Selim Gurun, Google, “Subject: Re: responding to Android Browser bugs,” January 23, 2014, GOOG-PLAY4-001703880-885, at 881.

<sup>867</sup> Brady (Google) Deposition, p. 346 (“Q. But at the point in time of this email, it hadn’t been publicly disclosed that Google was no longer supporting the Android open-source browser. Right? A. That’s correct”).

open-source Android apps Calendar,<sup>868</sup> Messaging, Gallery, Search, Browser,<sup>869</sup> Music, and Instant Messaging had all been “deprecated.”

### Exhibit 65 Google Marketing of Android as Open Source



<sup>868</sup> Email from Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, to Liza Ma, Google, "Subject: Re: AOSP calendar," September 24, 2013, GOOG-PLAY-001346566-568 ("Gabe, you make a good point, consumers should not get 2 calendar apps").

<sup>869</sup> PEmail from Bart Sears, Google, to Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, Selim Gurun, Google, "Subject: Re: responding to Android Browser bugs," January 23, 2014, GOOG-PLAY4-001703880-885, at 883 ("Note that to get the classic Browser working for KLP, we did need to disable some features (history, saved pages, etc.) that were using internal APIs.") and Brady (Google) Deposition, p. 337 ("Q. Okay. And so this indicates that in order to get the classic Android open-source browser working for the Key Lime Pie release of Android, Google had to disable history, save[d] pages and some other features that were using internal APIs. Right? A. That's what the email says."). I understand that the "Key Lime Pie" version of Android (discussed at Brady (Google) Deposition, pp. 336-337) was renamed "KitKat" and released in the fall of 2013. See Smith, Chris, "Android 4.4 KitKat official – here's what you need to know," *Android Authority*, October 31, 2013, available at <https://www.androidauthority.com/android-4-4-kitkat-official-what-you-need-to-know-313100/>.



*Source:* Patel, Rakesh, “Are AOSP apps meeting the needs of their audience?,” Google, February 25, 2015, GOOG-PLAY-002546242-279, at 247.

Additionally, by 2017, Google had stopped supporting the open-source Android Camera and Contacts apps, too.<sup>870</sup>

423. A competitor app store seeking to achieve better placement on the device UI than the Google Play Store would need to simultaneously offer substitutes for all these other apps. While in the past, an OEM could simply pair the open-source Android apps with a third-party or carrier app store (or the OEM’s own app store), by at least 2017, an OEM wishing to forgo the Play Store for a better-placed app store would need to find substitute apps to preload in lieu of taking the GMS suite. But the OEM’s ability to do *that* was constrained by the fact that over 80% of top Android apps rely on proprietary GMS APIs to function.<sup>871</sup> Even if OEMs could find substitute apps, those apps would not be integrated in third-party apps designed to function with GMS APIs. The combination of these services raises the costs of entry to competing app stores, who must either suffer the same or worse placement than the Google Play Store or solve the engineering challenge of replicating GMS apps and APIs *and* convincing third-party app developers to build versions of their apps that function with them.

424. The home screen placement preferences the Google Play Store over other Android app stores, and GMS apps are critical to OEMs and, collectively, provide the basic functionality that makes Android usable by consumers. Moreover, Google states that most OEMs of Android smart mobile devices, with the exception of Huawei and Amazon, have executed a MADA with Google.<sup>872</sup> Thus, using data from IDC, I calculate that, for 2020-2021, 96.15% of Android

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<sup>870</sup> Email from Junichi Monma, Google, to Madan Ankapura, Google, Jon Gold, Finance Manager for Android at Google, Sagar Kamdar, Google, “Subject: Re: Product improvements and contribution to AOSP,” January 24, 2017, GOOG-PLAY-008727310 (“AFAIK, we no longer maintain Camera and Contacts apps via AOSP”).

<sup>871</sup> *See, e.g.*, Google, “Android 101,” May 2019, GOOG-PLAY-000128863.R-908.R, at 876.R (stating that “826 of the top 1000 Android apps use 1 or more GMS Core APIs (Facebook, WhatsApp, Twitter, and many other apps”). *See also* Kolotouros Deposition, p. 448 (“Q. So, understanding that many developers utilize -- elect to utilize Google Play services that APIs and utilities make their apps better, it's fair to say that according to this slide, 826 out of the top thousand Android apps used one or more GMS core APIs; is that correct? A. Yes, I see that on the slide, yes”).

<sup>872</sup> Kolotouros (Google) Deposition, p. 93 (“Q. So in terms of OEMs, other than Huawei and Amazon, with respect to the Amazon variant of Android, are there any other OEMs that come to mind that you’re aware of that have not signed a MADA? A. No, not within like the mobile [/] tablet category”).



smartphone devices worldwide (excluding China) and 99.97% in the United States are sold by OEMs with a MADA.<sup>873</sup> Therefore, it is my opinion that the MADAs created barriers to entry for third-party app stores and enhanced and entrenched Google's market power in Android App Distribution.

2. *Google Restricted Competition from Third-Party App Stores Through Technological Barriers Aimed at Deterring Sideloads*

425. The final means by which a competing app store might reach users is direct downloading from the web, *i.e.*, sideloading, explained in Section III.C.2 above. However, Google requires that compatible OEM implementations of Android display a specific, cumbersome series of prompts and warning screens when Android users attempt to install an .apk downloaded from a website or third-party app store.<sup>874</sup> These restrictions increase the friction users experience in trying to install a new app store, which in turn causes users to abandon the attempt. These warnings are effective: Google data shows that sideloading accounts for only 4% of Android app installations (see Section III.C.2).

426. When a user attempts to sideload an app or app store, Google's unknown sources flow requires users to complete "15+ steps to get [the] app vs 2 steps with Play."<sup>875</sup> The "unknown

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<sup>873</sup> See Rysman Workpapers.

<sup>874</sup> Specifically, Google accomplishes this through "GooglePackageInstaller," which is the mandatory Google-designed proprietary middleware used to carry out user-initiated sideloading requests that must be preinstalled on GMS devices. This requirement is specified in the "GMS Requirements" document, which is incorporated by reference in agreements such as the MADA. For an example of a GMS Requirements document, and the requirement that GMS devices use "Google PackageInstaller," See Google, "GMS Requirements," September 3, 2019, GOOG-PLAY-001181435-503, at 453 ("GMS includes GooglePackageInstaller app, which is a Google-signed, prebuilt AOSP PackageInstaller. Every GMS Device MUST preload GooglePackageInstaller in place of AOSP PackageInstaller"). As Dr. Mickens explains in his report, the practical consequence of locking OEMs into a particular, Google-proprietary version of AOSP (open-source) middleware is that neither the moments at which installation friction is generated nor the prompts shown during those moments can be changed from their AOSP defaults. See Mickens Report at ¶ 166 & Figures 22 to 24.

<sup>875</sup> Google, "EPIC / Fortnite BC Deal Review," July 19, 2018, GOOG-PLAY-007278690-740, at 694.

sources” warning messages and the manner in which the compatible Android user interface displays them have changed over time and from device to device.<sup>876</sup>

427. According to an internal Google presentation, as of approximately 2016, the following steps were required before a user could sideload an app or app store:<sup>877</sup>

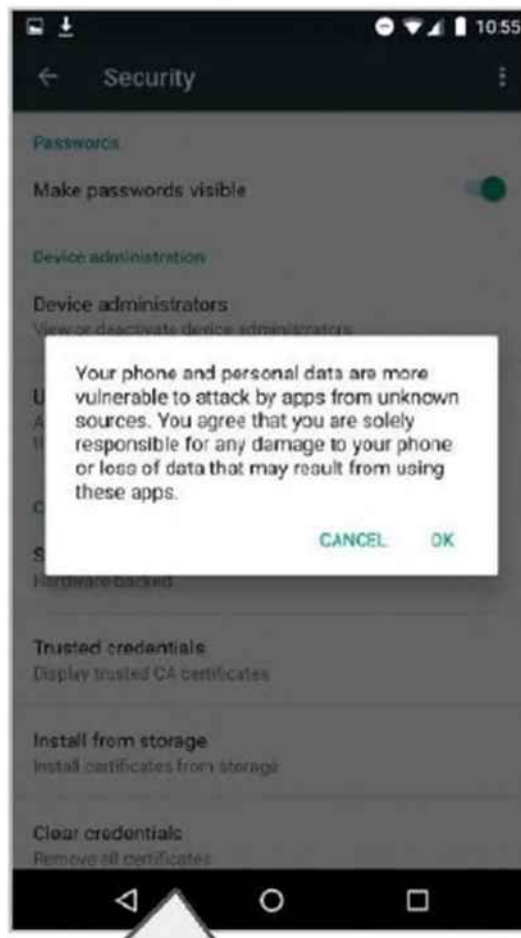
The user must search for the app using the device’s browser.

1. Once the webpage has been located, the user must find click the link to download the app.
2. The user must click the link to download the app.
3. The app downloads.
4. The user sees instructions on how to install the app.
5. The user must follow the app’s install instructions.
6. The user must go to Settings on their phone.
7. The user must select “Security.”
8. The user must toggle “Unknown Sources” to “on” (as the default is “off”).
9. A security warning like the below is then displayed:

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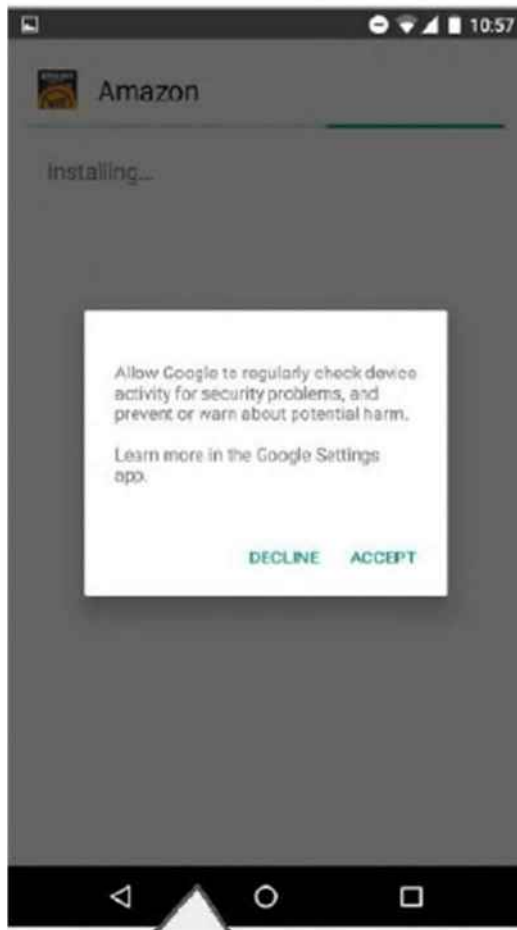
<sup>876</sup> See, e.g., Cunningham, Edward, “History of Android unknown sources,” Google, February 1, 2021, GOOG-PLAY-004903945-947 (noting the various warnings that Google has caused to be displayed on user devices). While the author of this memo described these warnings as AOSP defaults that can be modified by OEMs, (see Cunningham (Google) Deposition, pp. 164-166), this is not true for OEMs that license GMS on their devices. GMS devices must use the specific end-to-end workflow for installation friction prescribed by the GooglePackageInstaller middleware, which is the same as the AOSP default. See note 134 *supra*.

<sup>877</sup> Rolefson, Dave, Ben Byon, Adrienne McCallister, and David Noam, “Amazon Top Partner Review,” Google, March 17, 2016, GOOG-PLAY-04494298.R-325.R, at 318.R-320.R.



10. The user must click “ok” to confirm acknowledgment of the security warning. The function to allow “unknown sources” is now turned on.
11. The user must then install the .apk for the app.
12. The user must confirm they want to install the app.
13. Another user security warning like the below appears:

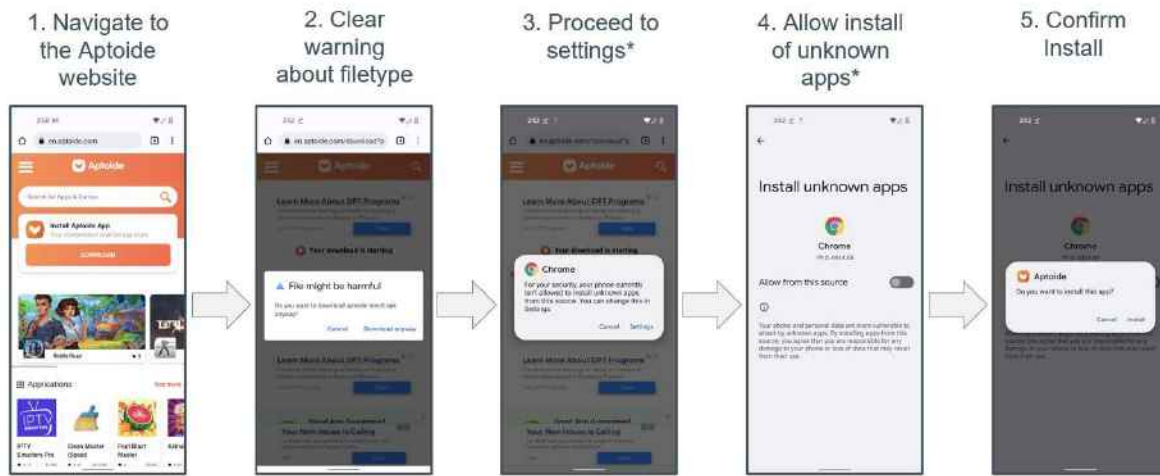
NON-PARTY AND PARTY HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY



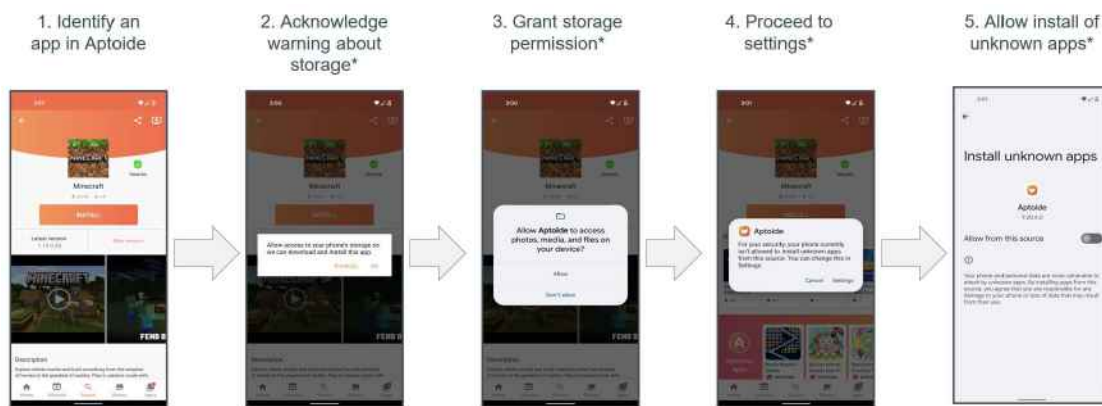
14. The user must click “accept” to confirm acknowledgment of the security warning.
15. The app is installed.

428. I understand that James W. Mickens, the Gordon McKay Professor of Computer Science at Harvard University, a co-director of Harvard’s Berkman-Klein Center for Internet and Society and a co-director of Harvard’s Institute for Rebooting Social Media, who has been retained as an expert by Epic Games, the Plaintiff States, and the Match Group Plaintiffs ran tests as part of his engagement in this matter to identify the steps Android must currently follow to download a

third-party *app store*. In Figure 23 of his report, as depicted below, he sets forth those steps using an attempt to download competing app store Aptoide as an example.<sup>878</sup>

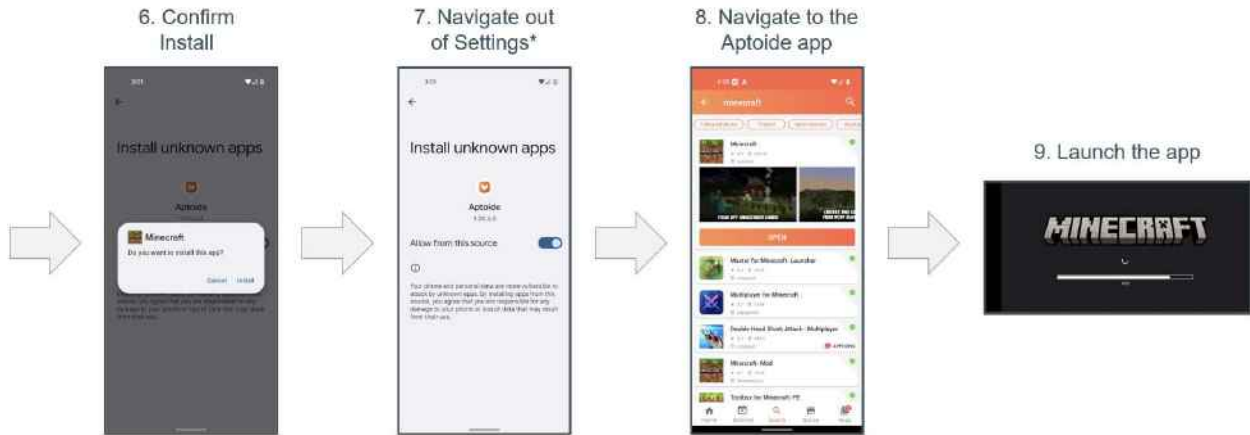


429. In Figure 22 of his report, as depicted below, Dr. Mickens sets out the steps Android users must currently follow to download an *app* from a competing app store (after the user has installed the app store on their device):<sup>879</sup>



<sup>878</sup> Mickens Report, p. 66 (describing Figure 23 as an “[e]xample of directly installing the Aptoide app store on a Pixel 4a phone running Android 12”). He notes that “[t]he same prompts and warnings were seen on the rest of the Android phones that we tested.”

<sup>879</sup> Mickens Report, pp. 65 (describing Figure 22 as an “[e]xample of installing an app via the Aptoide third-party app store” using “a Google Pixel 4a phone running Android 12”).



430. Dr. Mickens describes the steps as follows:<sup>880</sup>

In the leftmost screen, the user has located the app to install via the Aptoide app. In this particular example, the user wants to install the Minecraft app. When the user confirms the desire to install the app by clicking on the “Install” button, Android asks the user whether she wants to allow the app store to download the app’s APK file. Android then asks the user whether she allows the app store to access her phone’s “photos, media, and files.” Next, Android informs the user that “For your security, your phone is not allowed to install unknown apps from this source. You can change this in Settings.” If the user clicks on the “Settings” button in that dialog box, the user then has the option to enable app installation via the Aptoide store. If the user selects that option, Android shows another prompt which asks the user whether she wants to install the application. If the user clicks “Install,” Android returns the user to the “Settings” screen. The user must then manually navigate away from this screen and back to the Aptoide app screen. At this point, the user can finally launch the installed app. [If a user installs additional apps via Aptoide, the friction screens denoted by “\*” will no longer be shown during subsequent installs.].

431. All those steps amount to significant “user friction,” that is, the steps “impede[ ] a user from loading the store, browsing the store, downloading apps and keeping those apps up to date.”<sup>881</sup> Google executives have confirmed as much, noting that “any kind of friction will reduce installs”<sup>882</sup> and estimating that nearly 40% of users abandoned the download after one of the very

<sup>880</sup> Mickens Report, p. 65 (alteration in original).

<sup>881</sup> Lim (Google) Deposition, p. 255. *See also* Mickens Report, ¶ 99.

<sup>882</sup> Google, “AP-PS: Unknown Sources,” September, 2018, GOOG-PLAY-000219435.R-475.R, at 457.R (Google presentation noting that “adding any kind of friction will reduce installs (proposition is that there is about a 20% drop off for every acquisition in play, so for non play we expect similar)”).

first steps in the Unknown Sources Flow.<sup>883</sup> Google’s Tian Lim, Vice President of Engineering Product UX at Google, confirmed that “every millisecond is important in ensuring that a user gets the best experience.”<sup>884</sup> Moreover, he testified that “more steps typically leads to lower conversion.”<sup>885</sup> Jim Kolotouros, VP of Partnerships at Google, testified that “it is more difficult to directly download than it is to obtain an app through the Google Play Store.”<sup>886</sup> Simply put, the obstacles Google has erected make it less likely that users will actually complete the sideloading process and more likely that they will either give up on the download altogether or just get the app from the Play Store if it is available there.

432. Google’s security warnings and technological hurdles have made it more difficult to obtain even popular apps from well-known developers. For example, Fortnite is only available to Android users via sideloading, which Google recognized would limit distribution, because only [REDACTED] of U.S. users have the “unknown sources” setting enabled.<sup>887</sup> Likewise, Amazon’s “underground” app store is only available to Android users via sideloading, which Google recognized would make it “quite complex” for users to download.<sup>888</sup> Similarly, in summer 2018, after Google began flagging competing app store Aptoide as “a harmful app, hiding it in users’ Android devices and requesting them to uninstall it,”<sup>889</sup> Android users that attempted to download Aptoide received a warning message from Google that the download was “unsafe” and “can

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<sup>883</sup> Google, “App stores in Android 12,” March 24, 2020, GOOG-PLAY-004904016.R-118.R, at 038.R (a Google global analysis of the Unknown Sources Flow in 2016 showed that in versions of Android prior to O, [REDACTED] of users who encountered the ‘unknown source’ warning proceeded to enable the setting,” meaning that nearly [REDACTED] of users halted an installation attempt on one of the very first steps in the Unknown Sources Flow). *See also*, Google, “Auto scan blog post,” GOOG-PLAY-000415076-078, at 076 (noting that “fewer [than] [REDACTED] of installs in the last year occurred after a user received a warning that the app was potentially harmful”).

<sup>884</sup> Lim (Google) Deposition, p. 255.

<sup>885</sup> Lim (Google) Deposition, p. 258-59.

<sup>886</sup> Kolotouros (Google) Deposition, p. 99 (“Q – Would you agree that it is more difficult to directly download than it is to obtain an app through the Google Play Store? A – Yes, I would agree with that”).

<sup>887</sup> GOOG-PLAY-000219435.R, at 438.R.

<sup>888</sup> Rolefson, Dave, Ben Byon, Adrienne McCallister, and David Noam, “Amazon Top Partner Review,” Google, March 17, 2016, GOOG-PLAY-04494298.R-325.R, at 317.R.

<sup>889</sup> Lomas, Natasha, “Aptoide, a Play Store rival, cries antitrust foul over Google hiding its app,” *Techcrunch*, June 4, 2019, available at <https://techcrunch.com/2019/06/04/aptoide-a-play-store-rival-cries-antitrust-foul-over-google-hiding-its-app/>.



download potentially harmful apps.”<sup>890</sup> Aptoide estimates it lost 15-20% of its user base in the year following Google’s action.<sup>891</sup> Amazon further estimated that only 11% of unique visitors to the Amazon website on Android mobile devices that began the process of sideloading the Amazon Appstore completed it.<sup>892</sup> Former GetJar CEO Christopher Dury testified that as few as 1% of new GetJar users succeeded in downloading an app from the GetJar app store.<sup>893</sup>

433. A survey conducted by Dr. Stanley Presser in this matter confirms my conclusion that Google’s security warnings have foreclosed competition from sideloading by making it less likely that users will sideload apps or app stores. I understand that, at the request of counsel for the Plaintiff States and the Consumer Class, Dr. Presser designed a survey that was designed in part to estimate “the reaction of U.S. Android phone users to a warning message that may be displayed when the user attempts a download from a website or an app store that is not preloaded on the user’s phone.”<sup>894</sup> The relevant part of Dr. Presser’s questionnaire told respondents, “Here is a message that might appear on the phone you now use if you try to download an app from somewhere other than the Play Store,” and this warning message was displayed:

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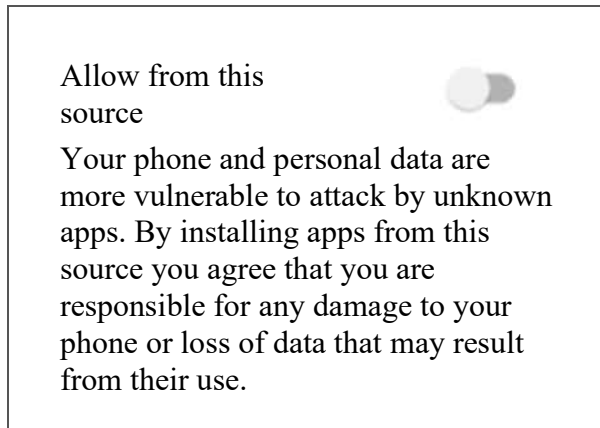
<sup>890</sup> Lomas, Natasha, “Aptoide, a Play Store rival, cries antitrust foul over Google hiding its app,” Techcrunch, June 4, 2019, available at <https://techcrunch.com/2019/06/04/aptoide-a-play-store-rival-cries-antitrust-foul-over-google-hiding-its-app/>.

<sup>891</sup> Lomas, Natasha, “Aptoide, a Play Store rival, cries antitrust foul over Google hiding its app,” Techcrunch, June 4, 2019, available at <https://techcrunch.com/2019/06/04/aptoide-a-play-store-rival-cries-antitrust-foul-over-google-hiding-its-app/>.

<sup>892</sup> Morrill (Amazon) Deposition pp. 169-70 (“Q. As of August 2020 what percentage of users that started the process of sideloading the Amazon Appstore completed that process – on Android? A. As written here, roughly 11% of unique visitors.”); PX1366, “Amazon Unlocks Coins Discounts for All Mobile Gamers,” AMZ-GP\_00003257-274, at -258 (“The current Hollywood App Store on Android requires up to 19 steps (Appendix K) for the customer to install a game on Hollywood to purchase IAP. Due to this friction, only 11% of unique visitors to our Mobile Landing Pages (MLP) successfully sign-in to Hollywood.”).

<sup>893</sup> Dury (GetJar) Deposition pp. 51-52 (“Q. Did the unknown sources warning make it harder for GetJar to compete with Android Market or Google Play? A. It made it much less likely for a consumer to install an application that they found on GetJar. They – we would observe that customers using GetJar for the first time would often fail to install the application they began to download. . . . the rate of install after download had a wide range. But it could be as low as 1 percent of downloads actually getting installed.”).

<sup>894</sup> Presser Report, p. 2.



Half of the respondents, randomly selected, were then asked, “If you saw this message on your phone, would you feel it was ... safe to download the app or it was not safe to download the app?” while the other half were asked “If you saw this message on your phone, would you feel it was ... not safe to download the app or it was safe to download the app?” Respondents were also asked, “Would this message make you less likely to download the app?” According to Dr. Presser’s report, “[m]ost respondents said that they would feel the app was not safe to download [82% (+/- 6%) and 86% (+/- 5%) in the two different orderings of the response options]. Likewise, most said they would be less likely to download it [84% (+/- 4%)].”<sup>895</sup>

434. Economic literature on user friction also confirms that Google’s efforts would decrease the number of users who sideload apps. Consumers are unlikely to have perfect information about whether sideloading is dangerous or not and are likely to take messages (security warnings) from Google seriously. The economics literature supports that consumers are responsive to information provided by sellers and that consumers would consume more of a good (or demand

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<sup>895</sup> Presser Report, p. 9.

would increase) if they believe the good is of high quality (and consume less if they believe the good is of low quality).<sup>896</sup>

435. The effect of these warnings and friction points is observable in Google's own data from devices with Google Play Protect<sup>897</sup> enabled. The data show that during the period February 2019 to December 2020, ████████ of installed apps on such devices were downloaded directly from the internet or a third-party app store.<sup>898</sup>

436. Google erected these technological hurdles despite its knowledge that very few apps installed via sideloading are harmful, noting "[v]ery few users have ever encountered a potentially harmful app, and even fewer have actually been affected by potentially harmful apps ... this risk is miniscule" and ████████ of installs from unknown sources are harmful."<sup>899</sup> Google also causes these warnings to be presented for *every* sideloading attempt, without making any individualized assessment of the risk posed by a particular sideloaded app,<sup>900</sup> even though it could easily act more selectively on phones with Google Play Protect. In particular, at present the sideloading warnings are shown to the users after the sideloaded app is downloaded but before it is installed.<sup>901</sup> At that point, on phones with Google Play Protect, Google can (and indeed does) scan the app to determine

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<sup>896</sup> Saeedi, Maryam, "Reputation and adverse selection: theory and evidence from eBay," *RAND Journal of Economics*, Vol. 50, No. 4, 2019, pp. 822-853, at 838; Kamenica, Emir and Matthew Gentzkow, "Bayesian Persuasion," *American Economic Review*, Vol. 101, No. 6, 2011, pp. 2590-2615, at 2606-2608. Further, evidence from the computer science literature based on experimental and field data suggest that mobile users experiencing security warnings "led to significantly higher perceived threat to personal information, more negative attitudes toward the mobile service and a lower tendency for future use." See Zhang, Bo, et al., "Effects of Security Warnings and Instant Gratification Cues on Attitudes toward Mobile Websites," *CHI '14: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 2014, pp. 111-114, at p. 114. Similarly, less than a quarter of Mozilla Firefox and Google Chrome users chose to ignore their "browser's malware and phishing warnings." See Akhawe, Devdatta, and Adrienne Porter Felt, "Alice in Warningland: A Large-Scale Field Study of Browser Security Warning Effectiveness," *Usenix Security Symposium*, 2013, pp. 257-272, at p. 270.

<sup>897</sup> Google Play Protect is the brand name for Google's efforts to protect Android phones from malware and other abusive applications. See Kleidermacher (Google) Deposition, p. 54. Play Protect can be turned off and on by the user. See Kleidermacher (Google) Deposition, pp. 57-60. Play Protect is not offered on phones built on the open source version of Android, only on Google-licensed Android phones. See Porst (Google) Deposition, pp. 46-47.

<sup>898</sup> See *supra* footnote 78.

<sup>899</sup> Google, "Auto scan blog post," GOOG-PLAY-000415076-078, at 076-077.

<sup>900</sup> Porst (Google) Deposition, pp.36-38 and 157 and 159.

<sup>901</sup> Porst (Google) Deposition, p. 40.

if it is malware.<sup>902</sup> Google Play Protect determines if an app is malware by generating a hash value on the phone for that app; the phone transmits that hash value to Google's remote servers.<sup>903</sup> Google's remote systems then compare the sideloaded app's hash value to Google's internally maintained "blacklist" (*i.e.*, the hash values of known malware<sup>904</sup>) and notifies the on-device Google Play Protect client if the sideloaded app's hash matches known malware.<sup>905</sup> (If two files have the same hash value, they are for practical purposes identical and pose the same malware risk no matter where the user acquires them.<sup>906</sup>) Moreover Google could, if it chose to, compare a sideloaded app's hash value with the hash values of apps on the Play Store and, thereby, determine if the sideloaded app is the exact same file as an app on Play Store.<sup>907</sup> In sum, at the time the sideloading warnings are displayed to users with phones featuring Google Play Protect, Google has enough information to determine if a sideloaded app is known to be malware, and if the app is identical to an app on Play Store.

437. Thus, by erecting technological hurdles, which reduce the likelihood that consumers will sideload apps, Google has foreclosed competing app stores and developers from nearly all distribution through sideloading.

### 3. *Google Restricted Competition by Paying Developers for Parity Terms*

438. I showed above how Google's conduct foreclosed competitors from entry and expansion in the three key distribution channels by which app stores can reach Android users: the Google Play Store, preloading, and sideloading. I now show that Google also sought to cut off rival app stores' access to apps from high-value developers, which, in turn, cut off their access to high-value consumers, by offering incentive payments to developers. Again, as noted above, if a rival is

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<sup>902</sup> Porst (Google) Deposition, p. 42 ("What happens at the time of installation is on devices that [have] Google Play Protect enabled, on devices that have an internet connection, on devices that have the ability to connect to Google's back end services. Google Play Protect would make a connection to these back end services and see if -- to see if we have seen this file before and whether we've already classified it as a known potentially harmful [app].")

<sup>903</sup> Porst (Google) Deposition, pp.43-45 and 51.

<sup>904</sup> Porst (Google) Deposition, p. 45

<sup>905</sup> Porst (Google) Deposition, pp. 52-53.

<sup>906</sup> Porst (Google) Deposition, pp. 45-46.

<sup>907</sup> Porst (Google) Deposition, pp. 45-46.

foreclosed from a share of developers, then fewer developers would attract fewer consumers, and then fewer consumers would attract fewer developers, etc., thereby magnifying the effect of foreclosure due to indirect network effects.

439. Google’s exploration of incentive payments to developers came in response to the competitive threat posed by Epic Games and Samsung. In August 2018, Epic announced it would not make Fortnite available on the Google Play Store but instead would distribute to users through the official Fortnite website.<sup>908</sup> According to Epic Games founder Tim Sweeney, there were two primary motivations for forgoing the Google Play Store in favor of direct distribution: (1) Epic wished to maintain a direct relationship with consumers; and (2) Epic believed Google’s 30% commission was “disproportionate to the cost of the services these stores perform, such as payment processing, download bandwidth, and customer service.”<sup>909</sup> In December 2018, Epic announced it would launch the Epic Games Store and Fortnite on PC and Mac, starting with a “hand-curated set of games,” and then open up to “other games and to Android and other open platforms throughout 2019.”<sup>910</sup> Google documents expressed concern that “[m]ore developers may choose to follow Fortnite’s example and go direct or choose to focus on stores other than Play which creates revenue leakage.”<sup>911</sup>

440. Subsequently, in December 2019, Epic announced it “intended to launch Fortnite on the Google Play Store, but with the request that Epic be exempt from Google’s policy of taking 30% of all in-app purchases.”<sup>912</sup> Google rejected those terms, stating: “We welcome any developer that

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<sup>908</sup> Statt, Nick, “Fortnite for Android will ditch Google Play Store for Epic’s website,” *The Verge*, available at <https://www.theverge.com/2018/8/3/17645982/epic-games-fortnite-android-version-bypass-google-play-store>.

<sup>909</sup> Statt, Nick, “Fortnite for Android will ditch Google Play Store for Epic’s website,” *The Verge*, available at <https://www.theverge.com/2018/8/3/17645982/epic-games-fortnite-android-version-bypass-google-play-store>.

<sup>910</sup> Sweeney, Tim, “Announcing the Epic Games store,” *Epic Games*, December 4, 2018, available at <https://www.unrealengine.com/en-US/blog/announcing-the-epic-games-store>.

<sup>911</sup> Google, “App Distribution,” September 2018, GOOG-PLAY-000542827.R-852.R, at 828.R. *See also* Google, “Games Velocity Program,” December 2020, GOOG-PLAY-004146689.R-757.R, at 692.R and Email from Purnima Kochikar, Director of Apps and Games at Google Play, to Erin Crosby, Google, Sameer Samat, VP of Product Management at Google, “Subject: Re: Banyan,” June 12, 2019, GOOG-PLAY-001877016.C-022.C, at 019.C.

<sup>912</sup> Morris, Seren, “‘Fortnite’ Rejected From the Google Play Store, How Can You Play ‘Fortnite’ on Android Devices?” *Newsweek*, December 12, 2019, available at <https://www.newsweek.com/fortnite-google-play-store-rejected-android-devices-1476910>.

recognizes the value of Google Play and expect them to participate under the same terms as other developers.”<sup>913</sup> Epic clarified its stance, stating “Epic doesn’t seek a special exception for ourselves; rather we expect to see a general change to smartphone industry practices in this regard.”<sup>914</sup> That response created concern within Google that other app developers would follow Epic’s lead.<sup>915</sup>

441. In 2018, Google also learned that the Samsung Galaxy Store was courting top developers, attempting to secure exclusive deals.<sup>916</sup> Google had received complaints from “top game & subscription partners” who felt that “Google’s 30 percent cut of Play Store sales is nothing short of highway robbery” and thus considered various business model changes.<sup>917</sup> Google was concerned that “Fortnite may legitimize ‘Samsung’ store & 3<sup>rd</sup> party stores” and estimated “the ‘downstream impact’ of Epic’s decision not to publish Fortnite on the Google Play Store as ‘550M (up to \$3.6B) potential revenue loss if broad contagion to other developers’ ensued.”<sup>918</sup>

442. Thus, similar to its attempts to dissuade competition from Samsung through Projects Banyan and Agave, Google launched incentive programs with large app developers to discourage them from enabling rival app stores to challenge the Google Play Store.<sup>919</sup>

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<sup>913</sup> Statt, Nick, “Google says it won’t grant Fortnite and exemption to the Play Store’s 30 percent cut,” *The Verge*, December 9, 2019, available at <https://www.theverge.com/2019/12/9/21003553/google-play-store-fortnite-epic-games-30-percent-cut-dispute>.

<sup>914</sup> Statt, Nick, “Google says it won’t grant Fortnite an exemption to the Play Store’s 30 percent cut,” *The Verge*, December 9, 2019, available at <https://www.theverge.com/2019/12/9/21003553/google-play-store-fortnite-epic-games-30-percent-cut-dispute>.

<sup>915</sup> Google, “EPIC / Fortnite BC Deal Review,” July 19, 2018, GOOG-PLAY-007278690-740, at 691. *See also*, Rosenberg (Google) Deposition, p. 318.

<sup>916</sup> Google, “Sundar / JY Lee prep doc,” January 9, 2018, GOOG-PLAY-004509271-273, at 272 (“Samsung continues to expand their ambitions in app & game distribution. This started with Fortnite and the Note 9 launch. Now we hear that Samsung is actively reaching out to the top game developers and asking them [to] consider distribution through Samsung Galaxy App store first or instead of via Play. On new devices, they have also moved the Galaxy Store app icon to sit on the default home screen, next to the Play Store. We are discussing with them and encouraging them to consider partnership with us in this area, rather than fragmenting user and developer experience”). *See also* Vu, Linda, Brian Brazinski, Josh O’Connor, Shafiq Ahmed, “Project Hug: Risk & Leakage Model,” Google, February, 2018, GOOG-PLAY-000005203.R-312.R, at 208.R (discussing Samsung as “[a]ggressively pursuing exclusive content deals with major game developers” and Epic as “[l]aunching mobile game store on Android”).

<sup>917</sup> Marchak, Mike, “Magical Bridge – Potential Developer POV,” Google, June, 2019, GOOG-PLAY-003938581.R-614.R, at 582.R. *See also*, Marchak (Google) Deposition, pp. 105-106 and 117-119.

<sup>918</sup> Google, “EPIC / Fortnite BC Deal Review,” July 19, 2018, GOOG-PLAY-007278690-740, at 691 and 694.

<sup>919</sup> *See* ¶¶ 402-407, *supra* (describing Projects Banyan and Agave), and Google, “Business Model / Policy,” GOOG-PLAY-004502766.R-771.R, at 769.R.

443. In late 2018, Google proposed Project Hug, an incentive program with top app developers that, in Google's view, were most at risk of abandoning the Google Play Store for alternative means of distributing their apps.<sup>920</sup> The goal of the program was to inhibit the "[g]rowing reach of 3P [app] stores."<sup>921</sup> For example, Lawrence Koh, former Director and Global Head of Games Business Development at Google, stated that Google's investment in Riot was necessary to ensure that Riot chose Play instead of launching their own Android store.<sup>922</sup> In particular, Google believed its efforts aimed at developers would limit the Samsung Galaxy Store's ability to offer "deep discounts" and, thus, limit off-Play distribution.<sup>923</sup>

444. Project Hug formally became the Games Velocity Program. The program was created to "[e]nsure major game titles launch on Play," "[e]ase Play revenue share agitation," and

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<sup>920</sup> Email from Samir Sayigh, Google, to Lei Zhang, Google, Mike Marchak, Director of Play Partnerships, Strategy and Operations, at Google, "Subject: Re: [Bear Hug] Plan for October," October 9, 2018, GOOG-PLAY-004595170-172, at 170-171; Google, GOOG-PLAY-000237792-797, at 792-793 and 795 and 797; Marchak (Google) Deposition, pp. 70-72 and 257-258. See also Google, "Games Velocity Program," December, 2020, GOOG-PLAY-004146689.R-757.R, at 692.R-695.R and 709.R-713.R; Marchak (Google) Deposition, pp. 380-382 ("Q How do you understand the four bullet points on the right side? What are they meant to depict? A It seems like they are describing the developers on the left. ... Q Okay. And one of the characteristics is that the developers may forego Play; correct? A That is one of the characteristics on the slide. Q And one of the characteristics under that is that these developers may have the capabilities to go it alone on Android; correct? A That's one of the three characteristics on the slide. Q And by "go it alone," is it fair to say that you understand Mr. Gambhir to mean that they could distribute their games outside of Google Play; correct? ... THE WITNESS: My understanding is all developers could distribute their games outside of Google Play. There's multiple app stores in sideloading. I believe when the bullet on capabilities references, you know, some -- that they've already established some infrastructure or something like that to do it. BY MR. EVEN: Q Okay. So then -- A Or a propensity or something like that. But I look at it all developers have the capability to go it alone on Android. Q But these were, as you say, some propensity to actually go through with it? ... THE WITNESS: Something like that where they've invested already or had some characteristics that aligned with that").

<sup>921</sup> Google, "Business Model / Policy," GOOG-PLAY-004502766.R-771.R, at 769.R.

<sup>922</sup> Email from Lawrence Koh, Former Director and Global Head of Games Business Development at Google, to George Yousling, Google, "Subject: Re: <Action Needed> Riot & GVP," February 13, 2020, GOOG-PLAY-000928690-692, at 691. See also Koh (EA (formerly Google)) Deposition, p. 299 ("And your view was that objective number 1, making sure Riot did not launch their own Android app store, that Google was paying a higher premium in the first year as Riot builds up their business, and that that was an investment that was well -- money well spent? ... THE WITNESS: Yes, that is correct").

<sup>923</sup> Google, "Project Banyan FAQs," GOOG-PLAY-000464148-153, at 151.



[d]eepen x-Google relationships.”<sup>924</sup> Specifically, with this program, there are three problems Google was looking to solve.<sup>925</sup>

- “Scaled developers with major brands (either a single title or a portfolio [sic]) can decide to go-it-alone / develop their own distribution [**Epic, Riot, Tencent**].”
- “OEMs / carriers with existing distribution can enter the app distribution business, with the aim of differentiation. Lowers the need to directly earn revenues, focuses their competition on rev-share + incentives for exclusives [**Samsung, OneStore, Huawei**].”
- “OEMs / carriers looking to maximize dollars earned per device preload other stores for a quick dollar [**Amazon**].”

445. Under the program, Google targeted 21 top game developers that accounted for approximately [REDACTED] of total consumer spend on the Google Play Store.<sup>926</sup> Google offered [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED].<sup>927</sup>

<sup>924</sup> Google, “Google Play Business Model,” August 19, 2020, GOOG-PLAY-003335786.R-823.R, at 796.R.

<sup>925</sup> Email from Paul Gennai, Product Management Director at Google, to Samer Sayigh, Google, Shafiq Ahmed, Onetime Play Finance Director at Google, “Subject: Re: Hug vs . Banyan,” GOOG-PLAY4-004529823-825, at 824. *See also* Koh (EA (formerly Google)) Deposition, p. 141 (Q. So the risk that was being identified here was the risk that top developers would leave Google Play and go to competing app stores; right? ... THE WITNESS: The concern there was that developers would stop prioritizing Google Play as a preferred destination for distribution and would start prioritizing their efforts on distributing on a different platform. BY MS. MOSKOWITZ: Q. On a competing Android app distribution platform? A. Yes, the competition”) and p. 177 (“Q. And in reading all of that sort of next to each other, do you understand that to be conveying the risk of competitor Android app stores gaining traction both in titles and user base over time? ... THE WITNESS: Competition attracting more developers and more users was a risk that was -- it's a -- one of the key considerations for Project Hug”).

<sup>926</sup> Google, “Games Velocity Program,” December, 2020, GOOG-PLAY-004146689.R-757.R, at 694.R. *See also* Marchak (Google) Deposition, January 13, 2022, pp. 379-381; Email from Purnima Kochikar, Director of Apps and Games at Google Play, to Erin Crosby, Google, Jim Kolotouros, Vice President, Android Platform Partnerships at Google, “Subject: Re: Banyan,” June 12, 2019, GOOG-PLAY-001877016.C-022.C, at 019.C.

<sup>927</sup> Google, “Games Velocity Program,” December, 2020, GOOG-PLAY-004146689.R-757.R, at 693.R. *See also* Email from Mike Herring, Google, to Ruth Porat, CFO at Google, “Subject: Briefing Note on Hug – for BC on 4/9,” April 8, 2019, GOOG-PLAY-000000807-815, at 808 and 810; Marchak (Google) Deposition, January 13, 2022, pp. 379-381; and Koh (Google) Deposition, pp. 362-363 (noting that the [REDACTED] was aimed at ensuring [REDACTED])

446. In a highly competitive market, most-favored-nations clauses in contracts may be beneficial, by reducing transaction or information costs.<sup>928</sup> However, in a market dominated by a single, entrenched firm that benefits from network effects, most favored nations clauses can be anticompetitive.<sup>929</sup> That is because to challenge such a firm, potential rivals must gain scale; and to gain scale they must attract customers away from the entrenched firm. In this market, a rival app store might attract users by giving developers lower commissions in exchange for exclusive content, features or functionality. Google has closed off this possibility, however, by paying developers in advance not to do it via parity clauses.

447. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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<sup>928</sup> Baker, Jonathan and Judith A. Chevalier, “The Competitive Consequences of Most-Favored-Nation Provisions,” *Antitrust*, Vol. 27, No. 2, 2013, pp. 20-26, at p. 22 (“A frequently cited motivation for [most-favored-nations clauses] is to reduce transaction and negotiation costs.”) and Salop, Steven C. and Fiona Scott Morton, “Developing an Administrable MFN Enforcement Policy,” *Antitrust*, Vol. 27, No. 2, 2013, pp. 15-19, at p. 18 (listing market conditions under which most-favored-nations clauses “are less likely to raise antitrust concerns,” including “smaller sellers that lack market power,” “[u]nconcentrated markets,” or “input with close substitutes”).

<sup>929</sup> Salop, Steven C. and Fiona Scott Morton, “Developing an Administrable MFN Enforcement Policy,” *Antitrust*, Vol. 27, No. 2, 2013, pp. 15-19, at p. 18 (stating that most-favored-nations clauses “are more likely to raise antitrust concerns” if they are “[p]rovided by large sellers with market power.”) and Baker, Jonathan and Fiona Scott Morton, “Antitrust Enforcement Against Platform MFNs,” *The Yale Law Journal*, Vol. 127, No. 8, 2018, pp. 2176-2202, at p. 2195 (“The adoption of platform MFNs is likely to harm competition through exclusion-absent efficiencies, because scale economies in platform operation typically create oligopoly markets that do not perform competitively. Platforms often benefit from strong scale economies in demand (network effects). They may also benefit from scale economies in supply. Exclusionary conduct that prevents a new entrant from gaining a toehold is particularly problematic when the market is likely to be concentrated”).

<sup>930</sup> Google and Activision, “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” January 25, 2020, GOOG-PLAY-007273439-444, at § 3.A; see also Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” December 2, 2019, GOOG-PLAY-007335447-450, at § 3.A(similar); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” February 28, 2020, GOOG-PLAY-

[REDACTED]  
[REDACTED]  
[REDACTED].<sup>931</sup>

448. Under Project Yosemite, Google offered to the developer [REDACTED] a “[REDACTED] [REDACTED] to strengthen partnership to focus on Play business on Android” because “[REDACTED] showed interest in their own app store,” which could have a margin impact on the Google Play Store of approximately [REDACTED].<sup>932</sup> Google believed that, “[i]f [REDACTED] moves] to [its] own app store, it may cause [a] huge negative financial impact to Google Play”<sup>933</sup> and there could be a mid- to long-term threat of “commercial contagion” if other developers “follow [REDACTED]”

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007273267-272, at § 3.A (similar with [REDACTED] Google and Electronic Arts, “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” March 4, 2020, GOOG-PLAY-010662251-255, at § 3.A (similar with [REDACTED] [REDACTED] Google and King, “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” August 28, 2019, GOOG-PLAY-007273051-054, at § 3.A (same as Activation Clause); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” October 28, 2019, GOOG-PLAY-007273160-164, at § 3.A (similar); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” March 31, 2020, GOOG-PLAY-007273309-313, at § 3.A (similar with exceptions for China and a process for seeking exceptions from Google); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” July 24, 2020, GOOG-PLAY-007335476-481, at § 3.A (exception for China and process for Google exception if app has no “ads, in-app purchase, or in-app subscription business models”); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” November 5, 2019, GOOG-PLAY-007273168-172, at § 3.A (applies only where Google Play is available (i.e. outside of China)); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” November 6, 2019, GOOG-PLAY-007273234-238, at § 3.A (similar); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” July 29, 2020, GOOG-PLAY-007273358-362, at § 3.A (similar); Google, “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” October 29, 2019, GOOG-PLAY-010661066-069, at § 3.A (similar); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” December 18, 2020, GOOG-PLAY-007335585-595, at § 3.A (similar); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” March 10, 2020, GOOG-PLAY-007847579-583, at § 3.A (similar); Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” January 19, 2021, GOOG-PLAY-007335471-475, at § 3.A (similar with [REDACTED] Google and [REDACTED], “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” January 8, 2020, GOOG-PLAY-007273404-408, at § 3.A (similar with [REDACTED] [REDACTED]

<sup>931</sup> *Id.* at § 3.B (generally).

<sup>932</sup> Google, “Yosemite + Booster PBF Update,” November 2017, GOOG-PLAY-000304837.R-892.R, at 840.R.

<sup>933</sup> Email from Junichi Monma, Google, to Marko Medenica, Google, Takeshi Kishimoto, Google, “Subject: Re: MVNO support in DCB,” April 12, 2017, GOOG-PLAY-003467770-773, at 772.

strategy.”<sup>934</sup> Thus, Google proposed “a custom partnership plan including the standard DCB rev-share deal to ensure [REDACTED] uses Play as the distribution platform for their [REDACTED] devices,” which was the “first special case” for a game developer.<sup>935</sup>

449. [REDACTED] was planning to build a mobile virtual network operator and launch “a high-spec Android phone optimized for [REDACTED] games including [REDACTED] in an effort to retain [REDACTED] high value users and increase their margins for games.”<sup>936</sup> As Google personnel observed, [REDACTED] believes that having more control over device and network service operation gives them more opportunity to provide custom VIP service for their HVUs (*e.g.*, loyalty point program across games IAP, real goods eCommerce, and mobile phone subscription.)”<sup>937</sup> Google and [REDACTED] executed a Games Velocity Program addendum in November 2019 with [REDACTED] [REDACTED].<sup>938</sup>

450. In addition to the GVP/Project Hug, in 2020, Google also created the Apps Velocity Program (“AVP”), a “proactive extension of existing Hug program ... to 20 strategic app developers (non-games)” to provide additional incentives to non-game app developers for “Subscriber Acquisition & Retention” and “Infrastructure Cost Reduction.”<sup>939</sup> As part of the AVP agreements, which are addenda to the DDA, Google offers [REDACTED] [REDACTED] to the developer, and developers [REDACTED] [REDACTED]

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<sup>934</sup> Google, “Assessment of [REDACTED] Partnership Opportunities,” GOOG-PLAY4-007226588-592, at 591.

<sup>935</sup> Email from Yoshitsuga Hirotaka, Google, to Jamie Rosenberg, Vice President of Strategy and Operations (Platforms and Ecosystems Division) at Google, “Subject: Re:...Confirmed: [REDACTED]” May 15, 2017, GOOG-PLAY-000084963-964, at 964.

<sup>936</sup> Email from Junichi Monma, Google, to Marko Medenica, Google, Takeshi Kishimoto, Google, “Subject: Re: [REDACTED] support in [REDACTED] April 12, 2017, GOOG-PLAY-003467770-773, at 770.

<sup>937</sup> Email from Junichi Monma, Google, to Marko Medenica, Google, Takeshi Kishimoto, Google, “Subject: Re: [REDACTED] support in [REDACTED] April 12, 2017, GOOG-PLAY-003467770-773, at 771.

<sup>938</sup> Google and [REDACTED] “Google Play Games Velocity Program Addendum to the Google Play Developer Distribution Agreement,” November 21, 2019, GOOG-PLAY-007273259-262, at 260.

<sup>939</sup> Google, “BC: Play App Accelerator Program (hug for Apps) (BC20-005),” February 19, 2020, GOOG-PLAY-007172256.R-266.R, at 256.R.

██████████<sup>940</sup> Developers ██████████  
 ██████████ are developers that signed AVP agreements with Google.<sup>941</sup>

451. Google’s anticompetitive efforts targeted at top developers were largely successful in protecting Google’s monopoly over Android App Distribution. For example, Google “offered a [Project] Hug-like deal to convince Riot to change [its] strategy,”<sup>942</sup> preventing the app developer Riot from distributing off-Play.<sup>943</sup> More generally, about 20 developers signed Google’s deal to protect its Play Store revenues.<sup>944</sup> While a small number of developers received Project Hug credits, they were the large developers that account for a large portion of the consumer spend on Google Play, and, thus, Google foreclosed rival Android app stores from a large share of spend through these developers.<sup>945</sup>

452. Google ultimately deemed these efforts a success, resulting in ██████████ Play risk mitigation.”<sup>946</sup> Further, Lawrence Koh, a former Google employee, testified that Project Hug, which

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<sup>940</sup> Google, “BC: Play App Accelerator Program (hug for Apps) (BC20-005),” February 19, 2020, GOOG-PLAY-007172256.R-266.R, at 256.R, 259.R. See also, Google and ██████████ “Apps Velocity Program Addendum to the Google Play Developer Distribution Agreement,” March 24, 2021, GOOG-PLAY-009214167-177, at 168-171; Google and ██████████ “Apps Velocity Program Addendum to the Google Play Developer Distribution Agreement,” June 27, 2021, GOOG-PLAY-011249830-841, at 832-836; Google and ██████████, “Apps Velocity Program Addendum to the Google Play Developer Distribution Agreement,” July 13, 2021, GOOG-PLAY-011249875-887, at 876-882; and Google and ██████████ “Attachment A Marketing Activity Promotion Title: App Velocity Program - Developer Managed Promotions,” December 20, 2021, GOOG-PLAY-011250003-016.

<sup>941</sup> Google and ██████████ “Apps Velocity Program Addendum to the Google Play Developer Distribution Agreement,” March 24, 2021, GOOG-PLAY-009214167-177; Google and ██████████ “Apps Velocity Program Addendum to the Google Play Developer Distribution Agreement,” June 27, 2021, GOOG-PLAY-011249830-841; Google and ██████████ “Apps Velocity Program Addendum to the Google Play Developer Distribution Agreement,” July 13, 2021, GOOG-PLAY-011249875-887; and Google and ██████████ “Attachment A Marketing Activity Promotion Title: App Velocity Program - Developer Managed Promotions,” December 20, 2021, GOOG-PLAY-011250003-016.

<sup>942</sup> Koh (Google) Deposition, p. 286

<sup>943</sup> Email from Lawrence Koh, Former Director and Global Head of Games Business Development at Google, to Google Personnel, “Subject: Fwd: [Privileged & Confidential] Riot – Update,” February 13, 2020, GOOG-PLAY-007035840-843, at 840. See also Koh (Google) Deposition, pp. 284-292.

<sup>944</sup> Google, “Games Velocity Program,” December 2020, GOOG-PLAY-004146689.R-757.R, at 694.R.

<sup>945</sup> These developers account for 20% share of total Play consumer spend. See Google, “Games Velocity Program,” December 2020, GOOG-PLAY-004146689.R-757.R, at 694.R.

<sup>946</sup> Google, “Games Velocity Program,” December 2020, GOOG-PLAY-004146689.R-757.R, at 707.R.

“mitigate[ed] our risk of losing out to competition” from Samsung and other competitors, “was working.”<sup>947</sup>

4. *Google Has Always Intended to Monopolize the Android App Distribution Market*

453. The anticompetitive purposes of Google’s conduct have been evident from the beginning. Google promoted Android to the market as an “open” system that would foster choice and competition, implying that the best apps and phones—and app stores—would win. Though Google initially said it never intended to “monetize” Android, it ultimately did.

454. If Google had not intended to foreclose competition from competing app stores, it could have offered competing app stores the option of being available for download through the Google Play Store. However, Section 4.5 of the DDA—which Google requires developers to accept as a condition of publishing apps on Google Play—forbids developers from using the Google Play Store “to distribute or make available any Product that has a purpose that facilitates the distribution of software applications and games for use on Android devices outside of Google Play.”<sup>948</sup> This policy, and prior iterations of it, effectively foreclosed competitor app stores from distributing on the Google Play Store, the most-used Android distribution channel.<sup>949</sup>

455. Over time, Google tightened these restrictions. The initial DDA prohibited only apps that had a “primary purpose” of distributing apps outside Android Market.<sup>950</sup> Google engineer Dan Morrill explained that “the intent of that clause is indeed 100% protectionist... It is explicitly intended to prevent people from using the Market to distribute a competing app store. It’s even described as ‘Non-Compete’ in the DDA.”<sup>951</sup> In 2014, Google revised the DDA language to remove

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<sup>947</sup> Koh (Google) Deposition, pp. 367-368.

<sup>948</sup> Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878, at 875, *available at* <https://play.google.com/about/developer-distribution-agreement.html>.

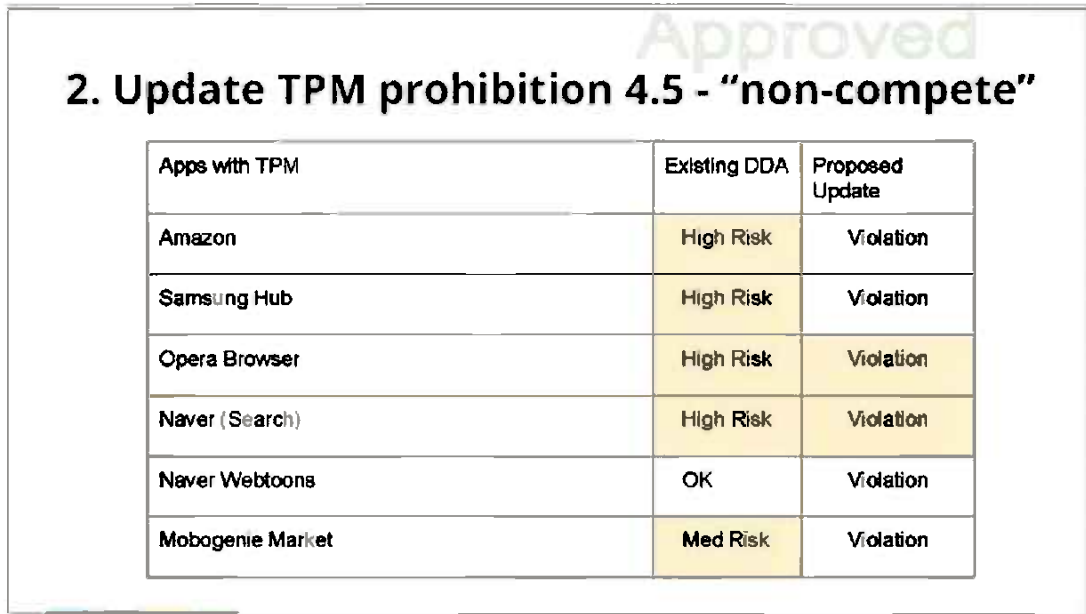
<sup>949</sup> Google, “Summary of Changes,” GOOG-PLAY-000270597-600 (summarizing DDA modifications from September 2014 to November 2020).

<sup>950</sup> “Android Market Developer Distribution Agreement, GOOG-PLAY-000054841-848.

<sup>951</sup> Email from Dan Morrill, Google, to Jeffrey Sharkey, Google, “Subject: Re: [android-vendingmachine] Handango app violates Market TOS,” May 20, 2009, GOOG-PLAY-004283892-896, at 892.

the word “primary,” knowing that the removal of that word from the DDA would put a number of developers that had been compliant with Google’s terms in violation of the new terms, as illustrated in a Google document depicted in Exhibit 66 below.<sup>952</sup>

**Exhibit 66**  
**Google’s DDA Revision Put More Developers in Violation**



Approved

## 2. Update TPM prohibition 4.5 - “non-compete”

Apps with TPM	Existing DDA	Proposed Update
Amazon	High Risk	Violation
Samsung Hub	High Risk	Violation
Opera Browser	High Risk	Violation
Naver (Search)	High Risk	Violation
Naver Webtoons	OK	Violation
Mobogenie Market	Med Risk	Violation

*Source:* Google, “DDA Update Q3 2014 Stakeholder communication,” Q3 2014, GOOG-PLAY4-004530839-887, at 843.

456. Google talking points for press and customer inquiries explained that the 2014 DDA changes were meant to “provide additional clarity around the distribution of third-party apps on Google Play to maintain a secure ecosystem.”<sup>953</sup> But an internal Google document revealed that one of the “benefits” to the wording change was ensuring that “[t]hird party markets don’t use Play’s distribution mechanism against Play to gain market share.”<sup>954</sup> That provision has harmed competition in the real world. Several competitor app stores have sought to distribute their app store

<sup>952</sup> Google, “DDA Update,” Q3, 2014, GOOG-PLAY4-004530839-887, at 843.

<sup>953</sup> Google, “PR Comms Doc: DDA Q3 Changes,” GOOG-PLAY-000218038-041, at 040 and Google, “DDA Launch Comms (consolidated),” September 9, 2014, GOOG-PLAY-000220592-598, at 596-597.

<sup>954</sup> Google, “DDA Launch Comms (consolidated),” September 9, 2014, GOOG-PLAY-000220592-598, at 594.



apps on Google Play, only for Google to block the app store from publication or remove it. Below I present two such examples, from the early days of Android.

457. **Handango.** Handango was a third-party app store that distributed apps for early mobile phone platforms such as Blackberry, Windows Mobile, Palm,<sup>955</sup> and, eventually, Android. Handango announced its plans to launch an Android app store in the fall of 2008<sup>956</sup>. Following the announcement, Google engineer Dan Morrill explained that “the Market terms of service will NOT allow Handango itself to put its application on the Market” and that the Android Market terms of service “will prevent apps like Handango from ‘bootstrapping’ themselves by getting installed via Market and then selling apps themselves outside of the Market.”<sup>957</sup> Morrill explained that “Handango will still be allowed to hypothetically strike deals with carriers to preload their store app in addition to or even instead of the Android Market,” but Google’s strategy was to strike revenue-sharing deals with carriers to prevent them from preloading competing app stores on their devices, as explained in Section VII.A.1.<sup>958</sup>

458. In May 2009, Handango published its app store on Android Market, and Google’s Eric Chu authorized Google to remove Handango from Android Market for violating Section 4.5 of the DDA.<sup>959</sup> In 2010, Handango was acquired by the app store company PocketGear, “creating the

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<sup>955</sup> Games Industry International, “First Half 2008 Handango Yardstick,” September 23, 2008, available at <https://www.gamesindustry.biz/first-half-2008-handango-yardstick-data-on-the-most-popular-smartphone-apps-with-games-topping-the-charts>.

<sup>956</sup> Ray, Bill, “Handango cashes in on Android,” The Register, October 2, 2008, available at [https://www.theregister.com/2008/10/02/handango\\_android/](https://www.theregister.com/2008/10/02/handango_android/).

<sup>957</sup> Email from Dan Morrill, Google, to Meghan Hughes, Google, Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, “Subject: Re: Android Market and Handango – please help us understand this --- thx!,” September 30, 2008, GOOG-PLAY-001382685-689, at 687.

<sup>958</sup> Email from Dan Morrill, Google, to Meghan Hughes, Google, Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, “Subject: Re: Android Market and Handango – please help us understand this --- thx!,” September 30, 2008, GOOG-PLAY-001382685-689, at 687.

<sup>959</sup> Email from Dan Morrill, Google, to David Conway, Google, “Subject: [android-vendingmachine] Re: Gandango app violates Market TOS,” May 19, 2009, GOOG-PLAY-001090916-918, at 916 (“I have obtained verbal approval from Eric Chu. Please take this app down at the earliest possibility”).

world's largest cross-platform mobile application store.”<sup>960</sup> In 2011, the combined store rebranded as Appia but then exited the third-party app store business to focus on designing white-label app stores for carriers and OEMs.<sup>961</sup>

459. *Amazon*. On September 9, 2014, Amazon launched a version of the Amazon App that gave consumers “access to Amazon’s digital products and services, including unlimited streaming of tens of thousands of movies and TV episodes at no additional cost for Prime members.”<sup>962</sup> Amazon explained that “[a]fter updating their existing Amazon App for Android, customers wishing to stream Prime Instant Video movies and TV episodes can install the Prime Instant Video players app, which is delivered exclusively via the Amazon Appstore.”<sup>963</sup> Amazon confirmed this release was also offering “the ability for customers to purchase videos, songs, audiobooks, *apps and games* from within the Amazon App” directly.<sup>964</sup>

460. Google soon noticed that Amazon “also made available their entire app store[] searchable and [offered] the ability to download apps through their core shopping app.”<sup>965</sup> In response, Google’s “ops team started plans to try to accelerate launch of [an] updated DDA to

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<sup>960</sup> The app store was cross-platform in the sense that it offered apps “for users of Android, Symbian, BlackBerry, Windows Mobile, Palm, Linux and Java handsets.” See Meyer, David, “PocketGear buys Handango to create giant app store,” *ZDNET*, February 24, 2010, available at <https://www.zdnet.com/home-and-office/networking/pocketgear-buys-handango-to-create-giant-app-store/>.

<sup>961</sup> Rao, Leena, “PocketGear Rebrands To Appia; Shifts To White-Label App Marketplace Platform,” *TechCrunch*, February 3, 2011, available at <https://techcrunch.com/2011/02/03/pocketgear-rebrands-to-appia-shifts-to-white-label-app-marketplace-platform/>.

<sup>962</sup> Amazon, “Prime Instant Video Now Available on Android Phones — Exclusively Via the Amazon Appstore,” September 9, 2014, available at <https://press.aboutamazon.com/news-releases/news-release-details/prime-instant-video-now-available-android-phones-exclusively>.

<sup>963</sup> Amazon, “Prime Instant Video Now Available on Android Phones — Exclusively Via the Amazon Appstore,” September 9, 2014, available at <https://press.aboutamazon.com/news-releases/news-release-details/prime-instant-video-now-available-android-phones-exclusively>.

<sup>964</sup> Perez, Sarah, “Google Removes Amazon’s App Listing from Google Play Search Following Addition of Appstore, Instant Video Integrations,” *TechCrunch*, December 11, 2014, available at <https://techcrunch.com/2014/12/11/google-removes-amazons-app-listing-from-google-play-search-following-addition-of-appstore-instant-video-integrations/> (emphasis added).

<sup>965</sup> Email from Atul Kumar, Google, to Sarah Karam, Google, Kevin Wang, Operations Consultant at Google, “Subject: Re: Fwd: Amazon Prime Instant Video finally comes to Android,” September 9, 2014, GOOG-PLAY4-007215136.R-39.R, at 38.R.

enforce.”<sup>966</sup> Approximately two weeks after Amazon’s new app version went live, Google released the new DDA Section 4.5 language precluding all developers from distributing or making available “any Product that has a purpose that facilitates the distribution of software applications and games for use on Android devices outside of Google Play.”<sup>967</sup>

461. Google then notified Amazon that its Amazon Mobile app violated Section 4.5 of the new DDA.<sup>968</sup> In response to the violation notice, Amazon removed that version of the Amazon App from the Play Store “from all countries except India,” and Google suspended that app on December 12, 2014, such that “new installs” of and “updates” to the app were “not possible.”<sup>969</sup> Amazon then published a new version of the Amazon App on Google Play, called Amazon Shopping, which did not provide users with the ability to purchase apps and games or link to the Amazon Appstore, including in India.<sup>970</sup>

462. Google used the Amazon example to create a new “Third party market violation workflow” to identify apps that “facilitate[e] distribution of apps.”<sup>971</sup>

##### 5. *Google Used its Valuable Advertising Programs to Restrict Competition from Rival App Stores*

463. Google used its valuable advertising campaigns as another means to foreclose competing app stores, by forcing app developers to distribute through the Google Play Store in order to use its advertising campaigns to promote their apps. Google’s Universal App Campaigns

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<sup>966</sup> Google, “Amazon DDA Violation postmortem,” GOOG-PLAY-004713191-194, at 192.

<sup>967</sup> Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878, at 875, available at <https://play.google.com/about/developer-distribution-agreement.html>

<sup>968</sup> Email from googleplay-developer-support@google.com to amazon-mobile-development@amazon.com, “Subject: RE: [9-0065000005307] 14-Day Notification of Google Play Developer Term Violation,” November 12, 2014, GOOG-PLAY-000830885.R-889.R, at 887.R-888.R; see also Google, “Amazon app policy violation details,” November 11, 2014, GOOG-PLAY-009580959-962.

<sup>969</sup> Email from Sarah Karam, Google, to Aaron Rova, Google, “Subject: Re: Update on DDA enforcement,” December 26, 2014, GOOG-PLAY-007135039.

<sup>970</sup> Email from Kevin Wang, Operations Consultant at Google, to Larissa Fontaine, Google, “Subject: Re: Amazon latest developments,” December 13, 2014, GOOG-PLAY-000831600-606, at 600; 9to5 Google, “Google forces removal of Amazon app from Play Store over hidden app store,” December 11, 2014, available at <https://9to5google.com/2014/12/11/google-amazon-app-store/>.

<sup>971</sup> GOOG-PLAY-000469931.

allows app developers to “get your app into the hands of more paying users” by “streamlin[ing] the process” and “making it easy” for developers “to promote your apps across Google’s largest properties.”<sup>972</sup> However, “App Campaigns is only available for apps distributed in the Play Store or on Apple’s App Store.”<sup>973</sup> Therefore, developers who choose to offer their apps on a competing app store – and therefore forego offering their apps on the Google Play Store pursuant to the DDA section 4.5 – cannot access Google’s App Campaigns.

464. App Campaigns is a key means to reach potential consumers.<sup>974</sup> Types of Google App Campaigns include app installs, which “[r]un ads that encourage people to install your app,” “automates targeting and bidding,” and allows developers to focus ads “on finding valuable users based on actions [they] care about, like in-app conversions”; app engagement, which “[e]ngage users who already [the developer’s] app and take[s] them to a targeted landing page”; and app pre-registration, which “[r]un[s] ads that build excitement and awareness for ... apps and games before they release on Google Play.”<sup>975</sup>

465. Google App Campaigns provide many useful services to app developers and advertisers. For example, Google App Campaigns streamline the process for app advertisers to connect with paying users by helping to promote apps across Google properties including Search, Google Play, YouTube, Discover on Search, AdMob, the Google Display Network, Google’s search partners, and other publishers who host app ads.<sup>976</sup> Google uses the advertiser’s text ideas, images, videos, and assets to “design a variety of ads across several formats and networks,” thereby eliminating the need for the advertiser or developer to create individual ads for App campaigns.<sup>977</sup>

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<sup>972</sup> See Google, “About App Campaigns,” available at <https://support.google.com/google-ads/answer/6247380?hl=en>.

<sup>973</sup> Google, “2021.09.10 – Defendants’ Supplemental Responses and Objections to Epic’s Second Set of Interrogatories (002).pdf,” September 10, 2021, p. 15.

<sup>974</sup> Google, “Find the people who will love your app,” available at <https://ads.google.com/home/campaigns/app-ads/>.

<sup>975</sup> Google, “About App Campaigns,” available at <https://support.google.com/google-ads/answer/6247380?hl=en>.

<sup>976</sup> Google, “About App Campaigns,” available at <https://support.google.com/google-ads/answer/6247380?hl=en>.

<sup>977</sup> Google, “About App Campaigns,” available at <https://support.google.com/google-ads/answer/6247380?hl=en> (“To get started, all you need to do is provide some text, a starting bid and budget, and let us know the languages and locations for your ads. We also strongly recommend that you provide at least one landscape image, one portrait video, and one landscape video, and where relevant, HTML5 assets. Our systems will test different asset combinations and serve ads that are performing the best more often, with no extra work needed from you”).

Apps Campaigns allow advertisers to access a record of changes to app campaigns with annotations on the performance chart to see how those changes might have impacted performance<sup>978</sup> and also offer free appointments with an Ads expert to provide support in crafting media strategies.<sup>979</sup> Google thus discourages Android App Distribution competition by limiting Google App Campaigns to developers who offer their Android apps exclusively on the Google Play Store.

**B. Google's Anticompetitive Conduct in the Android App Distribution Market Has Allowed it to Impose Supracompetitive Commissions**

466. Google's anticompetitive restrictions with regard to Android App Distribution has allowed it to charge supracompetitive commissions. As explained in Section VI.A.1, with few exceptions, Google has charged a 30 percent commission for paid apps and in-app digital content sold through Google Play's billing system.<sup>980</sup> In the following section, I show that the fee would have been lower under a competitive but-for world in which Google did not monopolize the Android App Distribution Market. Moreover, I find that fees in the but-for world would be lower in both the Android App Distribution and In-App Billing Services Markets, as enhanced competition on the Android App Distribution Market would make any anticompetitive tying arrangement on the Android In-App Billing Services Market ineffective, thereby allowing for competition in the latter market as well.

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<sup>978</sup> Google, "About App Campaigns," available at <https://support.google.com/google-ads/answer/6247380?hl=en>.

<sup>979</sup> Google, "About App Campaigns," available at <https://support.google.com/google-ads/answer/6247380?hl=en> and Google, "Find the people who will love your app," available at <https://ads.google.com/home/campaigns/app-ads/>.

<sup>980</sup> Google Play Console Help, Service fees, available at [https://support.google.com/googleplay/android-developer/answer/112622?hl=en&visit\\_id=637872098045257136-3276584470&rd=1](https://support.google.com/googleplay/android-developer/answer/112622?hl=en&visit_id=637872098045257136-3276584470&rd=1). There are a few exceptions: (i) starting July 1, 2021, the service fee "for each developer will be 15% for the first \$1M (USD) of earnings you make each year when you sell digital goods or services;" (ii) for automatically renewed subscriptions the service fee is 15 percent; (iii) "As of December 18, 2021, for developers who offer an alternative in-app billing system in addition to Google Play's billing system for transactions with users in South Korea... the service fee for such transactions using the Additional Billing System is equal to the service fee applicable for transactions via Google Play's billing system reduced by 4%." *See also* Google Play Console Help, Changes to Google Play's service fee in 2021, available at <https://support.google.com/googleplay/android-developer/answer/10632485>.

*1. Google Has Charged Commissions Substantially Above Its Marginal Costs and Has Offered Lower Rates on Several Occasions*

467. In Section VI.A.1, I explained that Google personnel deemed the 30 percent commission to be arbitrary, that the Google Play Store has enjoyed high margins, and that Google has estimated its transaction costs to be [REDACTED] percent of revenue.<sup>981</sup> All of these facts indicate that Google has charged a supracompetitive commission that is substantially above marginal costs.

468. In addition, Google has launched a number of discount programs to lower its commissions in certain circumstances, for example, when dealing with particularly sensitive or powerful developers and seemingly due to regulatory changes and competitive pressures.<sup>982</sup> Exhibit 16 summarizes information about Google's discount programs and shows that Google has offered commissions as low [REDACTED] and [REDACTED] under various discount programs. Appendix E provides more details about these programs and shows that, in most cases, the programs under which lower commissions were effective involved large developers and were of a non-temporary nature. Importantly, many of these programs seem to have been launched in response to competitive pressures that Google faced. In such instances, Google would negotiate

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<sup>981</sup> In addition, a Google presentation from around 2020-2021 provides an estimate [REDACTED] percent average payment processing fee to Google, and [REDACTED] percent average payment processing fee if direct carrier billing and gift cards are excluded. *See* Google, "Project Everest – Potential Evolutions Working Document," GOOG-PLAY-007819776-064, at 861; Cramer (Google) Deposition, pp. 392-393. *See also* Marchak (Google) Deposition, pp. 98-102, and associated exhibit (Email from Rashad Sharif, Google, to Felix Hu, Google, Mike Marchak, Director of Play Partnerships, Strategy and Operations, at Google, "Subject: Re: FOP value," April 22, 2019, GOOG-PLAY-000934740-742, at 740) where he testifies about Google's internal email correspondence from April 2019 discussing Google's offer of revenue share to Spotify and the associated [REDACTED] break-even revenue share, which, he testifies, "is quite a bit higher than others." *See also*, Email from Justin Mattson, Senior Software Engineer at Google, to Dan Morrill, Google, and Eric Chu, Google, "Subject: Re: [android-advocates] Re: [android-vendingmachine] Re: Change in default revenue share," December 17, 2009, GOOG-PLAY-001677481-484, at 481 (In reference to a change in developer revenue share from [REDACTED] "We have previously said that we don't make money from Market, we are now lying").

<sup>982</sup> *See, e.g.*, "Defendant Google's Answers and Objections to Developer Plaintiff's First Set of Interrogatories," United States of America, Google Play Store Developer Antitrust Litigation, Case No. 3:20-cv-05792-JD, July 6, 2021, at pp. 13-16. *See also* Google, "Subscribe with Google Addendum to the Google Play Developer Distribution Agreement," GOOG-PLAY-006409808-820; Google, "Audio Distribution Accelerator Program (ADAP) Program," GOOG-PLAY-003896481-482; and Google, "LRAP++: Program Details and Outreach Process," July 20, 2020, GOOG-PLAY-003330554-558.

lower commissions to provide incentives to developers to adopt Google Play Billing and comply with Google's payment policies.

Since many of these programs pertain to commissions for in-app content, I discuss these programs further in Section VIII.B below.

469. The evidence above indicates Google's ability and willingness to substantially decrease commissions in the face of the threat by certain developers to distribute their apps outside the Google Play Store (or not use Google Play Billing), as discussed above, or other goals related to growth and success of its business, thereby indicating that Google's 30% commission is supracompetitive. Nonetheless, such programs are limited, thereby demonstrating Google is able to broadly maintain its market power. For example, Google notes that fewer than 50 developers in the U.S. have entered into the LRAP, ADAP and SwG (Subscribe with Google) programs.<sup>983</sup> In addition, as of July 2022, only 21 developers had entered into GVP agreements and only 3 developers had entered into AVP agreements.<sup>984</sup> Moreover, these programs largely target subscription-based apps, which have more viable alternatives to Google Play than other types of apps offering in-app content because they can offer a consumption-only model where subscriptions are purchased through the developer website and the digital content is consumed in the app.<sup>985</sup> By contrast, a consumption only model is less viable for apps that involve purchasing digital content while using the app due to frictions described above.

470. Further, such programs have had limited effect on Google's average commission. Using Google's Play Store transaction data, I calculate the average commission across developers'

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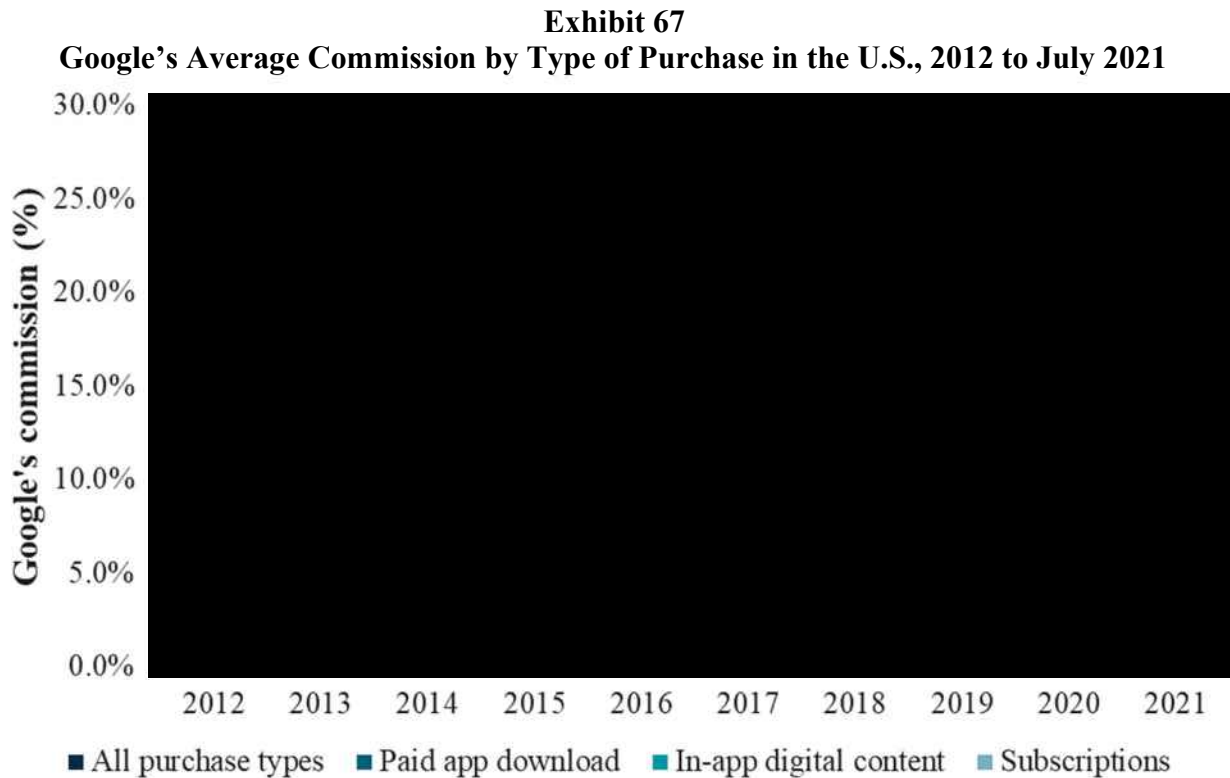
<sup>983</sup> See, e.g., "Defendant Google's Answers and Objections to Developer Plaintiff's First Set of Interrogatories," United States of America, Google Play Store Developer Antitrust Litigation, Case No. 3:20-cv-05792-JD, July 6, 2021, at pp. 14-16. Subscribe with Google is "a platform that enables both publishers and Google to understand when a user has a news subscription and makes sure that sites and products respond accordingly. Subscribe with Google also has an optional purchase flow that enables publishers to include a Google account-based checkout on their sites." To access the program, developers must "have a Newstand Agreement in effect" and "a Developer Account with Google Play" and must also "integrate the Implementation Requirements" and "charge no more for content through Subscribe with Google than the partner would charge for content on their own properties directly or through third parties." See "Subscribe with Google FAQs," GOOG-PLAY4-001404993 – 5001, at 4993-994.

<sup>984</sup> Letter from Brian C. Rocca to Yonatan Even, September 23, 2022, pp. 1-2.

<sup>985</sup> See, e.g., Google, "Project Everest – Potential Evolutions Working Document," GOOG-PLAY-007819776-064, at 785. See also Cramer (Google) Deposition, pp. 384-388.



sales in the U.S., overall and by type of transaction, for the period 2012 to July 2021.<sup>986</sup> As depicted in Exhibit 67, Google's average commission has largely remained near 30% for paid apps and in-app digital content purchases excluding subscriptions, whereas, due to the types of programs described above and in further detail in Section VIII.B below, its commission on subscriptions has declined from 30% in 2015 [REDACTED] in the first seven months of 2021.



*Note:* The data includes worldwide developers. All transactions relate to U.S. consumer transactions.

*Source:* Google Transaction Data.

471. Google documents confirm that its commission of 30 percent is arbitrary, high, and unsustainable, and that it has reacted or would react to competitive pressures: One document, entitled “Apps Marketplace Monetization Ideas,” for example, recognizes that Google’s 30%

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<sup>986</sup> Since the transaction level data produced by Google only relate to purchases in the U.S., I am unable to extend this analysis to purchases worldwide excluding China.

commission on developers' app revenues in the Play Store "is an arbitrary fee."<sup>987</sup> A May 2019 Google presentation states that "Play's business model is under increasing pressure" in part because the "30% rev share ('price') **seems arbitrary**" and there is "**[i]ncreasing competition** with different rev share (e.g. Epic, Samsung)."<sup>988</sup> Other examples abound.<sup>989</sup>

## 2. *Competitive But-For World Commission*

472. As the evidence above indicates, (i) Google's 30 percent commission is supracompetitive; and (ii) Google was able and willing to substantially decrease commissions in the face of competitive pressures or other goals related to growth and success of its business. Thus, it is

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<sup>987</sup> See Google, "Apps Marketplace Monetization Ideas," January 26, 2009, GOOG-PLAY-004630018.R-032.R, at 024.R; See also Google, GOOG-PLAY-004506631-633, at 631 ("The pricing (30% rev share on in app purchases) feels arbitrary and high to developers."). See also Google, "Play Business Model Thoughts," March 22, 2019, GOOG-PLAY-000565541.R-562.R, at 552.R (In reference to cons to maintaining the revenue share at 30%: "No rationale, other than copying Apple").

<sup>988</sup> Google, "Project Magical Bridge," May, 2019, GOOG-PLAY-004504494.R-506.R, at 495.R and 499.R ("30% somewhat arbitrary, but very clear and easy to understand"). See also Cramer (Google) Deposition, pp. 374-376.

<sup>989</sup> Google, GOOG-PLAY-009292321-357, at 329 ("[W]e all know that 30% is not sustainable and a rev share drop is inevitable."); Google, "Project Everest – Potential Evolutions Working Document," GOOG-PLAY-007819776-064, at 785 (Google presentation from around 2020-2021 listing [REDACTED]).

[REDACTED] See also Cramer (Google) Deposition, pp. 384-388; Google, "Project Basecamp – Optionality," April 14, GOOG-PLAY-006829073.R-172.R, at 157.R and 170.R-171.R (Google presentation describing a potential competitive dynamic as a process of "laddering up," i.e., allowing developers to use competing payment solutions (e.g., from Facebook, Amazon, or Stripe) and thereby enabling those companies to offer distribution and discoverability in addition to just payment solutions, and stating that Google expects "[d]eveloper agitation" even under 20-25 percent service fee); See also Marchak (Google) Deposition, pp. 473-475 ("And you understand the concept of laddering up was that Google was concerned that if it allowed developers to use competing payment solutions from somebody like Facebook or Amazon or Stripe, those companies may begin to offer discoverability and distribution in addition to just payment solutions; correct? ... THE WITNESS: I believe that was a concern that was brought up in this slide. I wouldn't say Google had that concern, but it was brought up in the slide... Q [REDACTED]

[REDACTED] correct? ... THE WITNESS: I see that [REDACTED] are highlighted here. Q You understand that by [REDACTED] correct?. THE WITNESS: I think the presenter was saying that [REDACTED]. I think that's what they are highlighting."); Email from Sameer Samat, Vice President of Product Management at Google, to Hiroshi Lockheimer, Senior VP of Platforms & Ecosystems at Google, "Subject: Re: Netflix," August 1, 2017, GOOG-PLAY-009911010-012, at 011 (August 2017 internal email from Sameer Samat, Vice President Product Management at Google, stating that [REDACTED]; Google, "Project Runway: Proposal for changes to Play business models," November 16, 2020, GOOG-PLAY-006990552-571, at 555 (2020 working Google document stating that if a [REDACTED]).

my opinion that, in a competitive but-for world in which Google did not monopolize the Android App Distribution Market—and hence did not foreclose the market to competitor Android distribution methods—there would be enhanced competitive pressure on Google. Developers and users would have more Android App Distribution alternatives from which to choose and potentially switch. As a result, commission would be lower than 30%.

473. The lower commissions that Google has offered to various developers over time, as described above, serve as upper bounds on what the commissions would look like in a competitive but-for world. In the competitive but-for world, competitive pressure on Google would be what Google has faced so far in the actual world plus additional pressure due to enhanced competition. In addition, the commissions would be lowered on both Android App Distribution and In-App Billing Services Markets as enhanced competition on the Android App Distribution Market would make any anticompetitive tying arrangement on the In-App Billing Services Markets ineffective and hence would allow for competition in that market as well.

474. I find that an upper bound on a commission in the Android App Distribution Market in a but-for world in which Google does not monopolize the Android App Distribution Market would be 15%. Furthermore, enhanced competition on the Android App Distribution Market would make any anticompetitive tying arrangement on the Android In-App Billing Services Markets ineffective and as a result an upper bound commission in the Android In-App Billing Services Market would also be 15%.

475. In Section VIII.B.2, I discuss why 15% is a conservative estimate of upper bound on the but-for commission in the Android In-App Billing Services Market in a but-for world in which Google has monopoly in the Android App Distribution Market but does not pursue an anticompetitive tying strategy. If Google, in addition, faced competition in the Android App Distribution Market, then the commission would reduce further thus making 15% a conservative estimate. In addition, with few exceptions, Google sets the same commissions on the two markets in the actual world. Thus, I find the commissions would likely not be different on the two markets in a but-for world in which Google faced competition in the Android App Distribution Market.

3. *Competitive But-For World Commissions Are In-Line with Commissions on Other App Stores*

476. I also evaluate whether this competitive but-for world commission is in line with commissions in other app stores, including PC app stores and alternative mobile app stores. Google itself considers PC app stores as “competitive benchmark[s]” when evaluating a “hybrid” model in which revenue share would be 20 percent with 0 percent for the first \$100K earned.<sup>990</sup> Hence, comparing Google’s commission in the Google Play Store to commissions offered by PC app stores is informative about whether Google’s commission for Android App Distribution through the Google Play Store is supracompetitive. Exhibit 68 below lists commissions charged to developers by several PC app stores.<sup>991</sup> These commissions are bounded above by Google’s commission of 30 percent and the lower commissions are in-line with the commissions that Google has offered to various price sensitive developers over time.

**Exhibit 68**  
**PC App Store Commissions**

App Store	Timeline	Commission
Chrome Web Store	2011 - present	1) 5% commission if using Chrome Web Store API to charge for features or virtual goods. 2) 30% commission for in-app payments for ARC (Android Runtime for Chrome) apps.
Epic Games Store	1) 2018 - present 2) 2018 - present	1) 12% commission for all games. 2) 5% licensing fee waived for games using Epic’s Unreal Engine.
Microsoft Store	1) - present 2) 2019 - present 3) 2021 - present 4) 2021 - present	1) 30% commission for Xbox console games. 2) 5% commission for non-game and non-Xbox apps when users download an app through a direct URL. 3) 12% commission for PC games. 4) no commission for apps using a third party payment processor.
Steam	1) 2018 - present 2) 2018 - present 3) 2004 - present	1) 20% commission for every sale in excess of \$50 million. 2) 25% commission for every sale between \$10 and \$50 million. 3) 30% for all other sales.
Game Jolt Store (Desktop)	present	0-10% commission set by the developer.

Source: See Appendix G.

<sup>990</sup> Google, “Play Business Model Thoughts,” GOOG-PLAY-000565541.R-562.R, at 558.R; Google, “Exploring new business models,” March, 2019, GOOG-PLAY-000542516.R-535.R, at 529.R-530.R.

<sup>991</sup> For more detailed information, see Appendix G.

477. The competitive dynamics among PC app stores provide an insight into how competition can drive commissions down below 30 percent and highlights the ability and willingness of app stores to aggressively compete on commissions in response to competitive pressures. For example, in December 2018, Epic launched its PC store and offered 12 percent commission to developers.<sup>992</sup> The same month, Steam decreased its commission from flat 30 percent to “30 percent cut on sales under \$10 million, then a 25 percent cut on sales between \$10 million and \$50 million, then a 20 percent cut on sales above \$50 million.”<sup>993</sup> Shortly after, in early 2019, Discord instituted “a reduced, 10-percent cut from game revenues generated on its online store ... one-upping the Epic Games Store and its recently announced 12-percent cut on the Epic Games Store.”<sup>994</sup> Following that, in March 2019, the Microsoft Store decreased its commission to tiers of 5 and 15 percent, from 30 percent, for “app purchases on Windows 10 PCs, Windows Mixed Reality, Windows 10 Mobile and Surface Hub devices.”<sup>995</sup> A few months later, in late 2019, Epic permitted developers and publishers who offered in-game purchases to use payment platforms other than Epic’s payment platform and, if they did so, would pay no commission to Epic.<sup>996</sup> Two years later, in the summer of 2021, the Microsoft Store likewise gave app developers an option “to bring their own or a third party commerce platform in their apps,” which would allow those developers to avoid paying Microsoft a commission.<sup>997</sup> Around this time, the Microsoft Store

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<sup>992</sup> Epic Games, “The Epic Game Store is Now Live,” December 6, 2018, available at <https://store.epicgames.com/en-US/news/the-epic-games-store-is-now-live>.

<sup>993</sup> Dillet, Romain, “Valve changes revenue-sharing tiers on Steam,” *TechCrunch*, December 3, 2018, available at [https://techcrunch.com/2018/12/03/valve-changes-revenue-sharing-tiers-on-steam/?guccounter=1&guce\\_referrer=aHR0cHM6Ly93d3cuZ29vZ2xILmNvbS8&guce\\_referrer\\_sig=AQAAALppmKB DcQzTmcmVRIAQ--JnZtWxEuQY6XBKIWKQYhgZ4LSXPSSQedJ3Jezb8w7pQpoaGNvI5zLtcAdidglTKOAEEnZ6hR7lhjmrzXfxAjthmUX XKtBtx1I9n1bZYuTi1EHXeNt669ERH0ZM5jReT-1BrJ6ecL3kO-XXYCevOTJez](https://techcrunch.com/2018/12/03/valve-changes-revenue-sharing-tiers-on-steam/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xILmNvbS8&guce_referrer_sig=AQAAALppmKB DcQzTmcmVRIAQ--JnZtWxEuQY6XBKIWKQYhgZ4LSXPSSQedJ3Jezb8w7pQpoaGNvI5zLtcAdidglTKOAEEnZ6hR7lhjmrzXfxAjthmUX XKtBtx1I9n1bZYuTi1EHXeNt669ERH0ZM5jReT-1BrJ6ecL3kO-XXYCevOTJez).

<sup>994</sup> Orland, Kyle, “Discord Store to offer developers 90 percent of game revenues,” December 14, 2018, available at <https://arstechnica.com/gaming/2018/12/discord-store-to-offers-developers-90-percent-of-game-revenues/#:~:text=Discord%20has%20announced%20that%20it,on%20the%20Epic%20Games%20Store>.

<sup>995</sup> Miller, Chance, “Microsoft updates Store revenue split to give developers a 95% cut, but with limitations,” *9to5Mac*, March 6, 2019, available at <https://9to5mac.com/2019/03/06/microsoft-store-revenue-share/>.

<sup>996</sup> Nguyen, Lisa, “Epic Games Store Gives Developers and Publishers More Choices For In-Game Payment Options,” *Happy Gamer*, December 9, 2019, available at <https://happygamer.com/epic-games-store-gives-developers-and-publishers-more-choices-for-in-game-payment-options-45712/>.

<sup>997</sup> Sardo, Giorgio, “Building a new, open Microsoft Store on Windows 11,” *Microsoft*, June 24, 2021, available at <https://blogs.windows.com/windowsexperience/2021/06/24/building-a-new-open-microsoft-store-on-windows-11/>.

decreased its commission for games from 30% to 12%.<sup>998</sup> Those changes reflect how, in a market that is a two-sided platform with indirect network effects, prices are driven down by competition.

478. Finally, Exhibit 69 shows the commissions offered by alternative Android app stores. Those commissions are generally below 30 percent, which provides yet another indication that mobile app stores are able and willing to decrease their commissions below 30%.

**Exhibit 69**  
**Alternative Android App Store Commissions**

<b>App Store</b>	<b>Timeline</b>	<b>Commission</b>
ONE Store	1) 2018 - present 2) 2020 - 2021	1) 20% commission and 5% for developers with their own payment methods. 2) 50% discount in commission for developers earning less than \$5 million in monthly transactions.
Amazon Appstore	1) - present 2) 2018 - present 3) 2018 - present 4) 2021 - present	1) 30% commission for mobile apps and in-app products. 2) 20% commission for movie and TV subscription products sold in mobile apps and 30% commission for non-movie and non-TV subscription products sold in mobile apps. 3) The lower of 30% commission or 80% of the list price for PC software/games and in-app products. 4) Small Business Accelerator Program: 20% commission for developers earning less than \$1 million in the previous calendar year. Additionally, developers will receive 10% of revenue in AWS promotional credits.
Aptoide	present	4-25% commission for in-app transactions.
Galaxy Store	present	30% commission that can be negotiated with Samsung.
Game Jolt Store (Mobile)	present	0-10% commission set by the developer.

Source: See Appendix H.

479. As illustrated above, commissions on PC app stores and alternative Android app stores are bounded by Google's commission of 30 percent and the lower commissions are in-line with the commissions that Google has offered to various price-sensitive or important developers over time. In addition, the observed competitive dynamic among PC stores illustrates how competition can drive commissions down below 30 percent and demonstrates the ability and willingness of app stores to compete aggressively on commissions in response to competitive pressures.

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<sup>998</sup> Warren, Tom, "Microsoft shakes up PC gaming by reducing Windows store cut to just 12 percent," *The Verge*, April 29, 2021, available at <https://www.theverge.com/2021/4/29/22409285/microsoft-store-cut-windows-pc-games-12-percent>.



#### 4. *Direct Discounts to Consumers*

480. In a world absent Google’s anticompetitive conduct, I find there likely would have been increased discounts to consumers. Providing direct discounts to consumers is an effective way to retain or acquire consumers when faced with competitive pressures. Other app stores have recognized this and have offered discounts to consumers in the face of competitive threats.

481. For example, as discussed in Section IV.A.6, in September 2018, Google launched Google Play Points, a consumer loyalty rewards program that allows users to earn points on their Google Play purchases and redeem them for content in the Google Play Store, thereby providing discounts directly to consumers.<sup>999</sup> Google initially launched Google Play Points in Japan, followed by South Korea approximately six months later and roughly one year after the regulatory change in South Korea and ONE store’s subsequent reduction of its commission to 20% (or 5% if developers choose their own billing service provider).<sup>1000</sup> Google eventually rolled out the Play Points consumer rewards program to over 22 markets, launching in the U.S. in November 2019.<sup>1001</sup>

482. Google launched the Play Points program in an effort to build user loyalty in response to some limited competitive pressure.<sup>1002</sup> A December 2018 Google document describes the competitive environment in Korea, noting that the Galaxy app store is emerging there while

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<sup>999</sup> See Google, “Google Play Points,” available at <https://play.google.com/console/about/googleplaypoints/>; Schoon, Ben “Google Play Points rewards program goes official, only works in Japan for now,” *9to5Google*, available at <https://9to5google.com/2018/09/18/google-play-points-official-rewards-program-japan/>.

<sup>1000</sup> Na, Hyun-joon and Minu, Kim, “Korean app market One Store vows to go global in 2022 with more popular games,” *Pulse*, August 24, 2021, available at <https://pulsenews.co.kr/view.php?year=2021&no=816068>.

<sup>1001</sup> See Schoon, Ben, “Google Play Points rewards program goes official, only works in Japan for now,” *9to5Google*, available at <https://9to5google.com/2018/09/18/google-play-points-official-rewards-program-japan/>; Mu-Hyun, Cho, “Google Play introduces reward points in South Korea,” *ZDNet*, April 22, 2019, available at <https://www.zdnet.com/article/google-play-introduces-reward-points-in-south-korea/>; Mok, Winston, “Google Play Points: a rewards program for all the ways you Play,” *Google*, November 4, 2019, available at <https://www.blog.google/products/google-play/google-play-points-rewards-program-all-ways-you-play>; Google, “Google Play Points: Frequently Asked Questions,” available at <https://play.google.com/console/about/programs/googleplaypoints/>.

<sup>1002</sup> See, e.g., Google, “Play 2021/25 Hiroshi Edition,” October 28, 2020, GOOG-PLAY-002650052.R-138.R, at 076.R (noting that Play Points can “[c]reate deeper relationships with users” and “[b]uild loyalty”). See also Google, “Play Points,” December 5, 2018, GOOG-PLAY-000953420.R-460.R, at 422.R (noting that one reason “Play Points seems like a great fit for KR” is due to “Competition: Galaxy app store emerging as a major player (Samsung launching revamped Store with S10 release); OneStore lowering rev share to court developers.”); and Google, “Google Play Points Developer Overview,” May 2019, GOOG-PLAY-000518034.R-071.R, at 037.R.



ONE Store was lowering revenue share to entice developers and states that, under those circumstances, “Play Points seems like a great fit for KR [Korea]” and the business rationale is to “deepen our relationship with HVUs [high-value users].”<sup>1003</sup> Another Google document about the Play Points program includes “retain HVU’s and sustain Play growth,” “help to **neutralize competitor programs**,” and “[i]mprove customer **satisfaction & perception**” as rationales for the program.<sup>1004</sup> As described in Section IV.A.6, transactions earning Play Points grew steadily after its introduction, both in transaction volume and revenue. Moreover, the number of Android users enrolled in Play Points has also steadily increased, and the average spending by consumers enrolled in Play Points is higher than those not enrolled in the loyalty program.

483. Similarly, other Android app stores have also pursued consumer discount/loyalty programs in efforts to attract or retain loyal consumers. According to Google, “[c]ompetitive Android stores such as Amazon Appstore in Japan **have reached ████████ of developer revenue**, mainly by attracting Play HVUs [high value users] with heavy discounts (20 – 50 % off).”<sup>1005</sup> And the Amazon Appstore offers “[u]p to **15% evergreen discount on Amazon Coins**” and “[u]p to 30% coin back promos for IAP (mostly 5%).”<sup>1006</sup>

484. Further, “One Store, for example, has also been offering promotions targeting consumers. As well as discount coupons, One Store offered cashback events, giving refunds of 30 to 50 percent on total transactions inside certain gaming apps. The number of people who purchased gaming apps through One Store in the third quarter increased by 19 percent compared to the same period a year earlier as a result.”<sup>1007</sup> Similarly, Aptoide has a digital currency system called

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<sup>1003</sup> Google, “Play Points Play Product Steering,” December 5, 2018, GOOG-PLAY-000953420.R-460.R, at 422.R.

<sup>1004</sup> Google, “Play Loyalty Program Options,” GOOG-PLAY-000302766-867, at 864 (emphasis in original).

<sup>1005</sup> Google, “Google Play Points – Loyalty Program,” February, 2018, GOOG-PLAY-001284083.R-162.R, at 086.R (emphasis in original).

<sup>1006</sup> Google, “Amazon competitor deep dive,” April, 2017, GOOG-PLAY-000879194.R-224.R, at 204.R (emphasis in original).

<sup>1007</sup> Kim Jung-Min, Chea Sarah, “One Store gains ground in local Android app market,” *Korea JoongAng Daily*, December 2, 2020, available at <https://koreajoongangdaily.joins.com/2020/12/02/business/industry/One-Store-app-market-Google/20201202175300439.html>.

AppCoins, which is used for in-app transactions and gives up to 20% bonus to customers across all purchases.<sup>1008</sup>

485. In 2022, Samsung offered a 30% discount to consumers for purchases from the Galaxy Store of at least \$2. Consumers could claim a maximum of 10 coupons in 24 hours. “Additionally, users who spend more throughout the promotion” were offered “exclusive benefits,” including “a \$3 coupon when you purchase something worth \$3.99 or more.” As PhoneArena points out, you can get a 20% discount coupon on your first purchase and a 30% discount on your third purchase. And finally, when you reach a total purchase of \$300, you will get a 99% coupon upon checkout.”<sup>1009</sup>

486. Thus, in a world absent Google’s anticompetitive conduct in which it faced competitive pressures throughout the relevant time period, it is my opinion that Google would have provided direct discounts to consumers, such as its Play Points loyalty reward program, earlier than it did in the actual world and with likely more generous rewards. However, in my model, I conservatively assume that Google would have launched such a program within approximately one year following the introduction of the Google Play Store, based on the example of Google launching Play Points in South Korea in response to ONE store’s subsequent commission reduction, as described above.<sup>1010</sup> Moreover, I have also assumed that the direct to consumer price discount from Play Points in the but-for world would be *at a minimum* comparable to the price discounts observed in the actual world. However, these assumptions about direct to consumer discounts are highly conservative. Under greater competition, Google’s discounts to consumers would likely be much more generous, as with other consumer discount programs offered by alternative Android app

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<sup>1008</sup> Aptoide, “AppCoins,” available at <https://appcoins.io/>; AppCoins, “Everything you need to know about AppCoins Credits [Updated],” April 12, 2019, available at <https://appcoins.medium.com/everything-you-need-to-know-about-appc-credits-a9f3b5855071#:~:text=Our%20User%20Incentive%20Programs%20allow,their%20in%2Dapp%20spending%20level.>

<sup>1009</sup> Everton, Jordan “Samsung offering 30% discount on purchases made from The Galaxy Store,” *Wirefly*, May 2, 2022, available at <https://www.wirefly.com/news/samsung-offering-30-discount-purchases-made-galaxy-store>.

<sup>1010</sup> Given the damages period starts August 16, 2016, damages would be unaffected even if I assumed that, in the but-for world, Google started a loyalty reward program any time within about four years after the introduction of the Google Play Store. Given it launched Play Points in South Korea within one year following the regulatory change and ONE store’s subsequent reduction of its commission, I find a launch date within four years to be reasonable.

stores described above, and these discounts may have started even earlier than approximately one year after the launch of the Google Play Store, rather than in November 2019 as it did in the actual world. Thus, though Google may have launched a consumer discount program even sooner after launch of the Google Play Store in a competitive world and provided even more generous discounts than it did in the actual world, I, nonetheless, use this start date and the actual-world discount levels as conservative assumptions of the direct- to -consumer discounts in a world absent Google's challenged conduct. Using Google's transaction data, I estimate the average price discount due to Play Points as the total value of Play Points during the period 2020-2021, calculated as 100 Play Points equaling a \$1 discount, divided by the total gross consumer spend in the Google Play Store.

**C. Google's Anticompetitive Conduct in the Android App Distribution Market Has Lowered Output and Harmed Innovation**

487. In addition to allowing Google to charge supracompetitive commissions, I find that Google's anticompetitive conduct in the Android App Distribution Market has also resulted in reduced output and innovation. In a competitive but-for world, in which Google did not monopolize the Android App Distribution Market, there would be higher output and greater innovation. As I explain in Section IX.A and derive it in my model in Appendix F, the output would be higher because more developers would be willing to enter the market as their expected profits from doing so would be higher given the lower commissions and higher direct discounts to consumers set by Google. This would translate into increased supply (*i.e.*, more apps and in-app content available

from developers).<sup>1011</sup> Consequently, there would be lower equilibrium price and higher equilibrium output.<sup>1012</sup>

488. To demonstrate that output would be higher in a world absent Google's anticompetitive restrictions, I estimate but-for output (product quantity) using a model of competition between apps in which developers supply apps and in-app content and compete on prices charged to consumers. The model also has free entry of apps, which determines the number of apps entering an app store. The model is developed and explained in more detail in Appendix F and discussed in Section IX.A. First, I estimate the increase in the number of apps. I estimate that the number of apps would increase by about 20%.<sup>1013</sup> Second, I estimate the equilibrium output in the but-for world in each year from August 16, 2016 to May 31, 2022.<sup>1014</sup> Exhibit 70 shows the actual and but-for output for each year from August 16, 2016 to May 31, 2022. The weighted average increase in output from the actual to the but-for world across this time period is about 20%.<sup>1015</sup>

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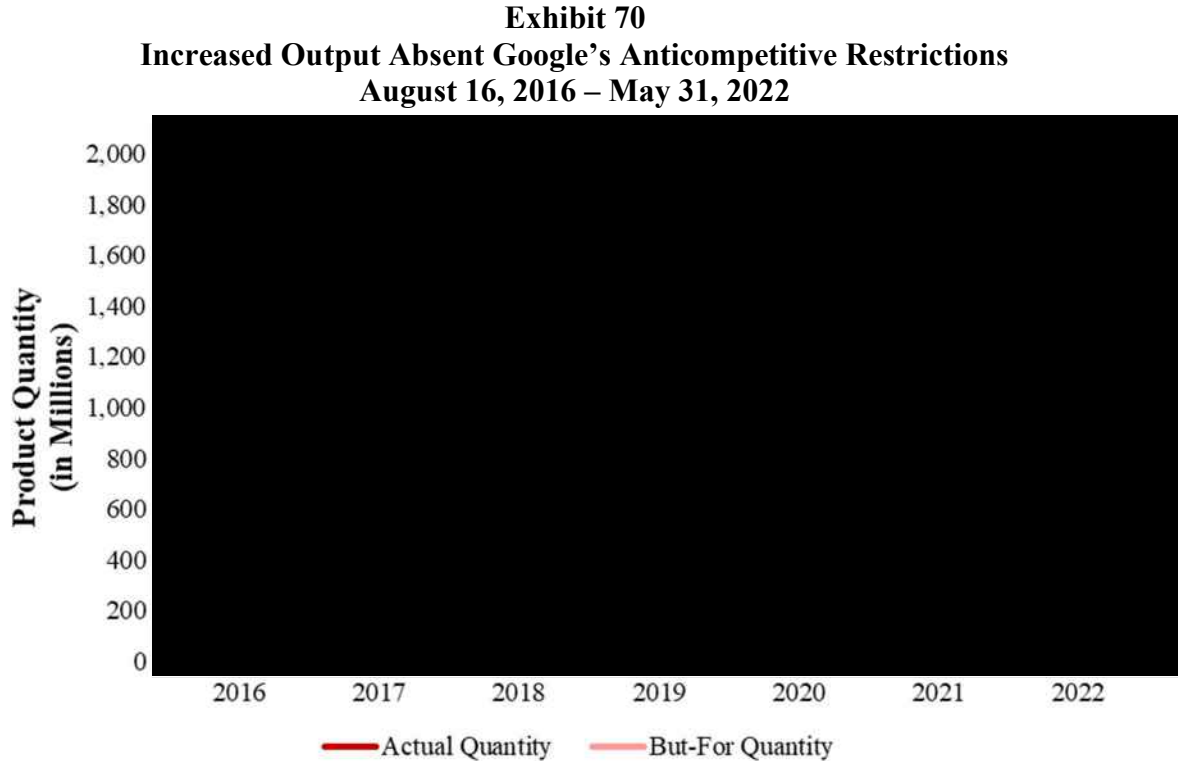
<sup>1011</sup> Mankiw, N. Gregory, *Principles of Microeconomics*, Fifth Edition, Mason, OH: South-Western CENGAGE Learning, 2008 (hereafter "Mankiw (2008)"), pp. 304-305. It has been shown that reduction in cost or increase in demand can lead to more entry and large benefits to consumers. *See e.g.* Janßen, Rebecca, Reinhold Kesler, Michael E. Kummer, and Joel Waldfogel, "GDPR and the Lost Generation of Innovative Apps," NBER Working Paper Series, 2022 (hereafter "Janßen et al (2022)"), pp. 1 and 22; Church, Jeffrey and Neil Gandal. "Complementary network externalities and technological adoption," *International Journal of Industrial Organization* 11, 1993, pp. 239-260 (hereafter "Church and Gandal (1993)"). In general, analyzing or quantifying the benefits of variety to consumers is common in the economics literature. *See, e.g.*, Dixit, Avinash K. and Joseph E. Stiglitz, "Monopolistic Competition and Optimum Product Diversity," *The American Economic Review*, Vol. 67, No. 3, 1977, pp. 297-308 (hereafter "Dixit and Stiglitz (1977)"); Petrin, Amil, "Quantifying the Benefits of New Products: The Case of the Minivan," *Journal of Political Economy*, Vol. 10, No. 4, August 2002 (hereafter "Petrin (2002)"); Brynjolfsson, Erik, Yu (Jeffrey) Hu, and Michael D. Smith, "Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Booksellers," *Management Science*, Vol. 49, No. 11, 2003, pp. 1580-1596 (hereafter "Brynjolfsson et al (2003)").

<sup>1012</sup> *See* Appendix F where I develop a model underlying my damages calculations. The model provides a mechanism through which lower service fee translates into increased supply of apps and in-app content, resulting into lower equilibrium price and output.

<sup>1013</sup> *See* Rysman Workpapers.

<sup>1014</sup> Note that this estimation is performed under a conservative assumption that there is only a direct effect of commission on app and in-app content price. For the discussion of direct effect of commission on price, in my model, *see* Section IX.A.1.

<sup>1015</sup> *See* Rysman Workpapers.



Source: Google Transaction Data.

489. Google's internal documents and testimony also acknowledge the positive effects of lowering Google's commissions on output, choice, and innovation. In a blog post, Sameer Samat, Vice President Product Management at Google, stated that "[s]tarting on July 1, 2021 we are reducing the commission Google Play receives when a developer sells digital goods or services to 15% for the first \$1M (USD) of revenue every developer earns each year. With this change, 99% of developers globally that sell digital goods and services with Play will see a 50% reduction in fees. **These are funds that can help developers scale up at a critical phase of their growth by hiring more engineers, adding to their marketing staff, increasing server capacity, and more.**"<sup>1016</sup>

490. In a Google document containing feedback regarding Google's reduction in commission for the first \$1 million in developer revenue, Sameer Samat wrote that "[w]e're

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<sup>1016</sup> Samat, Sameer, "Boosting developer success on Google Play," *Google*, March 16, 2021, available at <https://android-developers.googleblog.com/2021/03/boosting-dev-success.html> (emphasis added).

confident that this investment back into the developer community, particularly smaller ones, will lead to **increased innovation**, resulting in **more choice and lower prices** for users.”<sup>1017</sup>

491. Another Google document evaluates a scenario in which Google allows for “store optionality,” (*i.e.*, allowing alternative third-party app stores to distribute apps), noting that change would result in a more “[l]evel playing field on Android,” and would likely result in “user facing innovation.” The document also notes that “[i]ncreased competition leads to better user experience and content.”<sup>1018</sup>

492. Further, economic literature suggests that new apps that would enter the market as a result of enhanced competition and concomitant lower commissions would not be low-quality apps. A study by Janßen et al (2022), of the impact of the General Data Protection Regulation (GDPR), enacted by EU in May 2018, which imposes a series of rules intended to increase consumer security and privacy,<sup>1019</sup> found that entry of high-quality apps on the Google Play Store after enactment of GDPR fell by about 40 percent, about the same as low-quality apps.<sup>1020</sup> The post-GDPR decline in entry “reduced the number of both ex post successful and ex post unsuccessful apps ... [T]his provides strong evidence that app success is unpredictable, so that an entry reduction can deliver large welfare impacts.”<sup>1021</sup> Indeed, the authors found that “GDPR reduces the quarterly CS [consumer surplus] from \$45.0 billion to \$30.6 billion, or by 31.93 percent” and conclude “[w]hatever the benefits of GDPR’s privacy protection, it appears to have been accompanied by substantial costs to consumers, from a diminished choice set, and to producers from depressed revenue and increased costs.”<sup>1022</sup> Hence, imperfect predictability of app quality, before its entry,

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<sup>1017</sup> Samat, Sameer, “Straw man Biz Model,” February 22, 2021, GOOG-PLAY-002358233-240, at 236 (emphasis added).

<sup>1018</sup> Google, “Project Basecamp – Optionality,” April 14, GOOG-PLAY-006829073.R-172.R, at 168.R. *See also* Google, “Project Basecamp – Optionality,” April 14, GOOG-PLAY-006829073.R-172.R, at 165.R (indicating that store optionality refers to allowing third-party stores to distribute).

<sup>1019</sup> GDPR.EU, “Complete guide to GDPR compliance,” available at <https://gdpr.eu/>.

<sup>1020</sup> Janßen, Rebecca, Reinhold Kesler, Michael E. Kummer, and Joel Waldfogel, “GDPR and the Lost Generation of Innovative Apps,” *NBER Working Paper Series*, 2022 (hereafter “Janßen et al (2022)”), pp. 1 and 22.

<sup>1021</sup> Janßen et al (2022), p. 22.

<sup>1022</sup> Janßen et al (2022), pp. 2, 30.

mitigates concerns that only low-quality apps would enter after the reduction of commissions. This leads to substantial welfare gains as a result of enhanced entry of some high-quality apps.

493. Thus, as I explain above, in a world absent Google's anticompetitive conduct, it is my opinion that there would be increased supply (*i.e.*, more high-quality apps and in-app content available from developers), leading to lower equilibrium prices and higher equilibrium output, as well as increased innovation from developers.

### **VIII. Google's Anticompetitive Conduct Caused Harm to Competition in the Android In-App Billing Services Market**

494. Having concluded that Google monopolized Android App Distribution, foreclosing rival app stores and causing harm to competition, I now develop evidence and analyses to evaluate the allegation that Google has tied its Android In-App Billing Services to Android App Distribution. To distribute apps through the Google Play Store, Google requires app developers to enter its standardized Developer Distribution Agreement ("DDA"), which states that developers must exclusively use Google Play Billing, Google's in-app billing services provider, to process all in-app purchases of digital content for apps distributed through Google Play, though it does not require, or actually allow, the use of Google Play Billing to process purchases of tangible goods and services consumed outside the digital environment.<sup>1023</sup> I find Google has tied use of Google Play Billing to distribution through the Google Play Store.

495. I conclude that Google's anticompetitive restrictions with regard to Android App Distribution has allowed it to charge supracompetitive commission on the In-App Billing Market. Moreover, the conduct has led to reduced consumer choice (apps), output, and innovation. In addition, I conclude that (i) an upper bound on competitive but-for commission is most likely to be 15% which is consistent with most of the commission discount programs that Google has implemented; (ii) the competitive but-for Play Points would have been launched earlier and, under a

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<sup>1023</sup> Google, "Google Play Developer Distribution Agreement," November 17, 2020, GOOG-PLAY-000053875-878. See also, Play Console Help, "Payments," available at <https://support.google.com/googleplay/android-developer/answer/9858738>.



conservative assumption, the price discount through Play Points in the but-for world would be the same as in the actual world.

**A. Google’s Anticompetitive Conduct in Android In-App Billing Services Market Reduced Competition**

*1. Economics of Tying*

496. In economics, tying refers to a situation in which a firm conditions the sale of one product (tying product) on the sale of another product (tied product). That is, a seller of tying product refuses to sell the tying product to consumers unless consumers also buy the tied product.<sup>1024</sup> If a firm has monopoly or market power in the tying product market, then, by tying the products, it can extend its market power to the tied product market, thereby foreclosing sales and monopolizing the tied product market.<sup>1025</sup> As a consequence, in general, the consumer and total welfare decrease, rivals are disincentivized to enter the tied product market, and innovation is harmed.<sup>1026</sup>

497. Economists have identified various environments and mechanisms under which tying can harm competition and result in a consumer welfare loss. For example, tying can serve as a mechanism to price discriminate among buyers of a tying product when the tying and the tied products are complements and tied product is used in varying amount with the tying product.<sup>1027</sup> The benefits of tying arising from the enhanced ability to price discriminate have also been shown

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<sup>1024</sup> Carlton, Dennis W. and Michael Waldman, “The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries,” *The RAND Journal of Economics*, Vol. 33, No. 2, 2002, pp. 194-220 (hereafter “Carlton and Waldman (2002)”).

<sup>1025</sup> Whinston, Michael D., “Tying, Foreclosure and Exclusion,” *The American Economic Review*, Vol. 80, No. 4, 1990, pp. 837-859 (hereafter “Whinston (1990)”).

<sup>1026</sup> Elhauge, Einer, “Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory,” *Harvard Law Review*, Vol. 123, No. 2, 2009, pp. 397-481 (hereafter “Elhauge (2009)”); at pp. 397-401; Choi, Jay Pil and Christodoulos Stefanadis, “Tying, Investment, and the Dynamic Leverage Theory,” *The RAND Journal of Economics*, Vol. 32, No. 1, 2001, pp. 52-71 (hereafter “Choi and Stefanadis (2001)”); In addition to foreclosing sales and monopolizing the tied product market, tying can have anticompetitive effects on the tying product market. Tying can strengthen firm’s monopoly power on the tying product market by deterring future entry into that market. See Carlton and Waldman (2002), pp. 194, 198-205.

<sup>1027</sup> Elhauge (2009), pp. 404-405.

in an environment in which there is no strong positive demand correlation between the tied and tying product.<sup>1028</sup>

498. Additionally, in economic models that relax the assumptions of constant returns to scale and perfect competition in the tied good market, it has been shown that tying is frequently a profitable strategy for a monopolist - even for independent products (not complements), a tying strategy can be profitable for a monopolist, foreclosing sales in the tied good market.<sup>1029</sup> Further, a bundling strategy can also be profitable, mitigating impact of competition:

A company with a monopoly in product *A* and a duopoly in product *B* makes higher profits by selling an *A B* bundle than by selling *A* and *B* independently. Leveraging market power from *A* into *B* and accepting some one-product competition against the bundle is better than using the monopoly power in good *A* all by itself. Since bundling mitigates the impact of competition on the incumbent, an entrant can expect the bundling strategy to persist, even without any commitment.<sup>1030</sup>

499. Finally, resonating with some of the key lessons from economic theory, the Federal Trade Commission has explained the anticompetitive nature of tying as follows:

a monopolist may use forced buying, or ‘tie-in’ sales, to gain sales in other markets where it is not dominant and to make it more difficult for rivals in those markets to obtain sales. This may limit consumer choice for buyers wanting to purchase one (‘tying’) product by forcing them to also buy a second (‘tied’) product as well. Typically, the ‘tied’ product may be a less desirable one that the buyer might not purchase unless required to do so, or may prefer to get from a different seller. If the seller offering the tied products has sufficient market power in the ‘tying’ product, these arrangements can violate the antitrust laws.<sup>1031</sup>

## 2. *Google Has Tied Android App Distribution Through Google Play to Google Play Billing In-App Billing Services*

500. In the current case, the tying product/service is the distribution of apps on Android smart mobile devices through Google Play, and the tied product/service is Google Play Billing

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<sup>1028</sup> Elhauge (2009), pp. 405-407.

<sup>1029</sup> Whinston (1990), pp. 838-840.

<sup>1030</sup> Nalebuff, Barry, “Bundling as an Entry Barrier,” *The Quarterly Journal of Economics*, Vol. 119, No. 1, 2004, pp. 159-187, at p. 159.

<sup>1031</sup> Federal Trade Commission, “Tying the Sale of Two Products,” available at <https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/single-firm-conduct/tying-sale-two-products>.

services. I have been instructed by counsel to analyze whether the distribution of apps on Android smart mobile devices through Google Play and Google Play Billing services are separate and distinct products/services; whether Google has monopoly or market power in the distribution of apps on Android smart mobile devices through Google Play; and whether there is “coercion,” meaning that the firm (Google) conditions the sale of the distribution of apps on Android smart mobile devices through the Google Play Store on the sale of Google Play Billing services and that the tying arrangement affects a not insubstantial volume of commerce in the market for Android In-App Billing Services.

501. I have previously demonstrated the first two criteria. In Sections V.C and V.D, I established that the Google Play Billing Services is a product distinct from the distribution of apps on Android smart mobile devices through Google Play, and I have defined the two markets, respectively. Further, I have shown and show further below that separate firms sell these products. In particular, developers could obtain payment processing and other in-app services from other firms besides Google but for contractual restraints imposed by Google. Further, I provide evidence that developers would like to do so. That is, developers do not perceive a technological benefit from tying the two products such that we should regard the tied products as a single new product. In Section VI.A, I have further shown that Google has a monopoly power in the market in which the tying product is sold.

502. Having established that the tied product (In-App Billing Services) is a distinct product and Google has a monopoly power in the tying product (Android App Distribution), I next demonstrate that Google has tied Android App Distribution through Google Play to the Google Play Billing In-App Billing Services and coerced app developers into the tying arrangement, which affects “a ‘not insubstantial volume of commerce’” in the Android In-App Billing Services Market.

503. In its agreements with app developers, in addition to the app distribution restrictions imposed by Google’s DDA discussed above, the DDA also requires developers to use Google Play Billing exclusively for all subsequent in-app purchases of digital content in the apps that were downloaded through Google Play: “Play-distributed apps requiring or accepting payment for access to in-app features or services, including any app functionality, digital content or goods (collectively ‘in-app purchases’), must use Google Play’s billing system for those transactions unless Section 3

or Section 8 applies.”<sup>1032</sup> Sameer Samat, Vice President Product Management at Google, effectively testified that Google required this tie, stating “[o]ur business model has been that for the developers that ... choose to distribute through Play and sell digital goods inside their app would be charged a service fee ... and were required to integrate with a set of payment APIs and flows that were part of the Google Play platform.”<sup>1033</sup>

504. Further, the DDA also expressly prohibits developers from steering users to payment methods other than Google Play Billing, noting:<sup>1034</sup>

Other than the conditions described in Section 3 and Section 8, apps may not lead users to a payment method other than Google Play’s billing system. This prohibition includes, but is not limited to, leading users to other payment methods via:

- An app’s listing in Google Play;
- In-app promotions related to purchasable content;
- In-app webviews, buttons, links, messaging, advertisements or other calls to action; and
- In-app user interface flows, including account creation or sign-up flows, that lead users from an app to a payment method other than Google Play’s billing system as part of those flows.

While developers can technically offer to sell content on their websites, as Mr. Samat claimed,<sup>1035</sup> developers cannot inform users within an app or app listing that they could go to the developer website, or elsewhere, and purchase the same content at a lower price. Thus, users in the midst of

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<sup>1032</sup> Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878; Google Play Console Help, Payments, available at <https://support.google.com/googleplay/android-developer/answer/9858738>. Note that Google’s Vice President Product Management, Sameer Samat, posted a blog in September 2020 noting that “We’ve always required developers who distribute their apps on Play to use Google Play’s billing system if they offer in-app purchases of digital goods, and pay a service fee from a percentage of the purchase.” See Samat, Sameer, “Listening to Developer Feedback to Improve Google Play,” *Android Developers Blog*, September 28, 2020, available at <https://android-developers.googleblog.com/2020/09/listening-to-developer-feedback-to.html>. Also, note that previous versions of the agreement, in addition, had an exception for “digital content consisting of **music, movies, TV shows, books, newspapers or magazines** that can currently be **used outside of the app** itself (e.g., buying songs that can be played on other music players).” See also Google, “Google Play Developer Program Policies,” March 9, 2012, GOOG-PLAY-006347283-285.

<sup>1033</sup> Samat (Google) Deposition, pp. 469-471; see also, Samat (Google) Deposition, pp. 483-485.

<sup>1034</sup> Google Play Console Help, available at <https://support.google.com/googleplay/android-developer/answer/9858738?hl=en>.

<sup>1035</sup> Samat (Google) Deposition, p. 484.

engaging with an app and prepared to make an in-app purchase could not be informed to make the purchase through an alternative means.

505. Sections 3 and 8 of the DDA summarize exceptions to the above rules involving purchases by users in South Korea and purchases of physical goods and services consumed outside the Play-distributed app.<sup>1036</sup> Section 8 states that developers may offer alternative in-app billing systems to users in South Korea.<sup>1037</sup> Importantly, Google was forced to institute the exception related to South Korea following the August 2021 policy change in South Korea, which prevented “app store operators from requiring developers to use their in-app purchase systems.”<sup>1038</sup> Section 3 provides exceptions for non-digital goods and other services, noting Google Play Billing “must not be used” for such services.<sup>1039</sup>

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<sup>1036</sup> Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878; Play Console Help, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>. *See also*, Google, “Google Play Developer Program Policies,” March 9, 2012, GOOG-PLAY-006347283-285, at 284.

<sup>1037</sup> Section 8 states that “developers of Play-distributed apps on mobile phones and tablets requiring or accepting payment from users in South Korea for access to in-app purchases may offer users an in app billing system in addition to Google Play’s billing system...” (See Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878; Play Console Help, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>).

<sup>1038</sup> Fathi, Sami, “Apple’s Proposal to Allow Third-Party Payment Methods in App Store ‘Lacks Detail,’ Says South Korean Regulatory Commission,” *MacRumors*, February 3, 2022, available at <https://www.macrumors.com/2022/02/03/app-store-plan-lacks-detail-south-kore/#:~:text=In%20August%2C%20South%20Korea%20passed,payment%20methods%20within%20their%20apps;Google,“Google%20Play%20Developer%20Distribution%20Agreement,”November%2017%2C%20GOOG-PLAY-000053875-878.>

<sup>1039</sup> “Google Play’s billing system must not be used” for purchase or rental of physical goods, purchase of physical services, remittance in respect of a credit card bill or utility bill, payments for content or services facilitating online gambling, peer-to-peer payments, online auctions, and tax exempt donations, payments for any product category deemed unacceptable under Google’s Payments Center Content Policies. (See Play Console Help, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>; Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878). *See also*, “Google Play Developer Program Policies,” March 9, 2012, GOOG-PLAY-006347283-285, at 284.

3. *Google Actively Enforces its Tie by Coercing App Developers into the Tying Arrangement*

506. As early as the planning stages for its Android Market for In-App Billing service (“IAB”), which launched in March 2011<sup>1040</sup> and was the predecessor to Google Play Billing, Google was already intent on enforcing a tying arrangement to ensure that developers used their billing service for in-app payments. At the launch of its In-App Billing service, Google stated “[t]he In-app Billing service manages billing transactions between apps and users, providing a consistent purchasing experience with familiar forms of payment across all apps. At the same time, it gives you full control over how your digital goods are purchased and tracked. You can let Android Market manage and track the purchases for you or you can integrate with your own back-end service to verify and track purchases in the way that’s best for your app.”<sup>1041</sup> A Google internal communication indicates that apps were in fact using third-party billing services at that time, and, despite Google’s prior claims of giving developers control, Google was planning how to transition these apps to their own billing service.<sup>1042</sup> Google contemplated a temporary transition period of providing warnings before eventually reducing or eliminating the warning period altogether:<sup>1043</sup>

In a meeting about our IAB rollout and messaging yesterday, the discussion turned to how we will ‘transition’ apps using other in-app payments systems to our IAB service. Specifically, for apps that use an in-app system that violates the DDA, it might be better to reach out with a warning, giving them a limited period of time to move to IAB before there’s a takedown. This could be especially important during the first few months that our IAB service is fully released and available. Once the service is more widely known and implemented, I think the warning period could be reduced or eliminated altogether.

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<sup>1040</sup> Chu, Eric, “In-App Billing on Android Market: Ready for Testing,” *Android Developers Blog*, March 24, 2011, available at <https://android-developers.googleblog.com/2011/03/in-app-billing-on-android-market-ready.html> (“Back in January we announced our plan to introduce Android Market In-app Billing this quarter. We’re pleased to let you know that we will be launching In-app Billing next week.”).

<sup>1041</sup> Chu, Eric, “New Merchandising and Billing Features on Android Market,” *Android Developers Blog*, February 2, 2011, available at <https://android-developers.googleblog.com/2011/02/new-merchandising-and-billing-features.html>.

<sup>1042</sup> Email from Dirk Dougherty to Anita Mhaskar, “Subject: Re: Warning policy for apps using other inapp payment systems, March 10, 2011, GOOG-PLAY-004320094.

<sup>1043</sup> Email from Dirk Dougherty to Anita Mhaskar, “Subject: Re: Warning policy for apps using other inapp payment systems, March 10, 2011, GOOG-PLAY-004320094.

507. Since then, as discussed in Section V.D.2 above, a number of developers have not complied with Google's Google Play Billing policy and have not used Google Play Billing. Google actively monitored which developers have not been complying with its Google Play Billing policies, and, in instances in which app developers have not been fully compliant (*i.e.*, they adopted alternative payment methods for digital in-app purchases), Google has informed such developers to comply with its rules and transition to Google Play Billing for digital in-app purchases.

508. In September 2020, Google clarified its Payments Policy incorporated into the DDA "to be more explicit that all developers selling digital goods and services in their apps are required to use Google Play's billing system."<sup>1044</sup> Google extended the date of compliance with the revised policy until June 1, 2022.<sup>1045</sup> Several large developers have explained that this was a change in Google's policies.<sup>1046</sup> The effect of the clarification is that many developers who were not paying Google anything because they were able to use an alternative Android In-App Billing Service provider (or their own) must now pay Google a commission as high as 30% for the first time or else

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<sup>1044</sup> Google, "Understanding Google Play's Payments policy," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en>. "Developers in India have until October 31, 2022 to comply due to unique circumstances with the payments landscape in the country."

<sup>1045</sup> Google, "Understanding Google Play's Payments policy," available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en>. "Developers in India have until October 31, 2022 to comply due to unique circumstances with the payments landscape in the country."

<sup>1046</sup> *See, e.g.*, Alzetta (Spotify) Deposition pp. 27-28 ("Q. Did Google ever inform Spotify that its payments policies were being updated? A. Yes. Q. When did Spotify become aware of the planned update to Google's payment policy? A. In the fall of 2019 Google contacted us to say they were making some changes. They wanted to ensure universal usage of Google Play billing."); *id.* at 29 ("Q. Prior to the policy announcement in 2020, were there any Google policies that impacted Spotify's decision to use its own payment solution? A. We didn't believe so."); Perryman (Netflix) Deposition, p. 23 ("Q. At some point I gather in 2017, Netflix learned that Google was planning to require all of Netflix's in-app transactions on Android to be done through Google Play Billing exclusively; is that true? A. Yes. Q. And that was a change from how things had been done in the past? A. Yes.").



stop offering in-app purchases.<sup>1047</sup> In response, some developers, such as Amazon,<sup>1048</sup> Netflix,<sup>1049</sup> and Tidal,<sup>1050</sup> decided to make their Android apps “consumption-only,” meaning that digital content may be purchased outside the app (such as on the web) to be used in the app. The result is that consumers cannot buy in-app what they could before, like Kindle books or movie streaming. Existing developers cannot monetize as once they could, facing revenue losses from customers who purchase consumable digital content solely through Google Play.<sup>1051</sup>

509. Moreover, Google has actively enforced these rules by punishing developers who fail to abide by them.<sup>1052</sup> For example, Fortnite was suspended from Google Play due to the Google Play Store payment policy violation when it enabled its own payment method in the app.<sup>1053</sup> In

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<sup>1047</sup> [REDACTED] Deposition, pp. 23-24 (“Q. And Google told [REDACTED] that the fee Google was going to charge [REDACTED] for these Google Play Billing transactions was [REDACTED] depending on the circumstances; is that fair? A. Yes.”).

<sup>1048</sup> Laura Hautala, “Here’s Why Amazon Won’t Let You Buy Books on Kindle App for Android Anymore,” CNET (June 2, 2022), *available at* <https://www.cnet.com/tech/services-and-software/heres-why-amazon-wont-let-you-buy-books-on-kindle-app-for-android-anymore/> (“Amazon let customers know on Tuesday they can no longer rent or buy books or pay for Kindle Unlimited subscriptions using the Kindle app. In an email, the company explained people will have to pay for the digital content on a web browser and then access the books through their app’s digital library. The change was necessary ‘to remain in compliance with updated Google Play Store policies,’ Amazon said in the email.”).

<sup>1049</sup> Perryman (Netflix) Deposition, p. 89 (“Q. What did Netflix ultimately decide in that regard? A. Based on the quasi-experiments and the holdback tests that we ran, we decided it was in our best interest to move to consumption only.”).

<sup>1050</sup> Tidal, “Google Play Store,” <https://support.tidal.com/hc/en-us/articles/4472166442769-Google-Play-Store>, accessed Oct. 3, 2022 (“Q: Why can’t I sign up for HiFi or HiFi Plus in the Android app? A: While you can sign up for TIDAL Free in the app, we have made some changes to the TIDAL HiFi and HiFi Plus sign up process in order to comply with new rules from Google for apps on the Google Play Store. At this time, it is unfortunately not possible to sign up for HiFi or HiFi Plus in the Android app. We are sorry for the inconvenience.”).

<sup>1051</sup> [REDACTED] Deposition p. 93 (“Q. What this analysis shows in Rows 54 through 58 of Exhibit 2054 is that the move from using [REDACTED] own method of payment in its Android app to being a consumption-only Android app cost [REDACTED] right? A. That’s what this analysis shows, yes. . . . Q. When we say [REDACTED] the analysis is for one year of sign-up[s]; right? A. That’s correct.”).

<sup>1052</sup> Play Console Help, “Understanding Google Play’s Payments policy,” available at <https://support.google.com/googleplay/android-developer/answer/10281818?hl=en> (“Google Play’s billing system is required for developers offering in-app purchases of digital goods and services distributed on Google Play . . . Starting June 1, 2022, any app that is still not compliant will be removed from Google Play.”).

<sup>1053</sup> Email from The Google Play Team to Haseeb Malik, Mobile Publishing at Epic Games, “Subject: Re: 000 – Holiday break. Will return Jan 6. Happy Holidays! Re: Your message about Google Play [0-3017000028863], EPIC\_GOOGLE\_01941268 (Explaining that, “[Y]our app continues to violate **Payments** policy, which generally prohibits games published on Google Play from providing a payment method other than Google Play Billing to purchase in-app virtual currency or in-app digital downloads.”). *See also* Malik (Epic Games) Deposition, p. 15; and Email from Tim Sweeney, Epic Games, to Epic Games personnel, December 13, 2019, EPIC\_GOOGLE\_00006187-193, p. 189.

2020, several apps developed by Cracku, a developer providing online coaching and test preparation material for MBA Exams, Banking Exams, SSC, and Railways exams, were removed from Google Play due to the Google Play Store payments policy violation. Google claimed that at least one of the Cracku apps “uses a payment system that bypasses Google Play’s in-app billing feature within the app experience.”<sup>1054</sup> Yet, Google does not apply the same standards to first party apps. For example, even though Google found Epic to be in violation of the DDA for using its own payment system in August of 2020, some Google first party apps were not in compliance with Google Play’s billing policy. For example, Eric Chu, former Engineering Director at Google, testified that it was his understanding that it was “absolutely fine under the DDA for YouTube to use its own payment system,” at the time.<sup>1055</sup>

#### 4. *Developers May Prefer Alternatives to Google Play Billing for Various Reasons*

510. Developers’ attempts to bypass Google’s payment policies to choose alternative in-app billing services methods have revealed their preference for alternatives to Google Play Billing. In some instances, developers have considered Google Play’s policies ambiguous with respect to the “digital content that may be consumed outside of the app,”<sup>1056</sup> which Google recognized.<sup>1057</sup> In addition, developers have voiced various concerns about Google Play Billing, including:<sup>1058</sup>

- “My billing platform is a competitive advantage and would perform better for me;”

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<sup>1054</sup> Cracku, available at <https://cracku.in/>; Google, “App Name: SB I, IBPS PO, SSC, CAT Exam Preparation 2020,” June 18, 2020, GOOG-PLAY-004696864-870, pp. 865 and 869.

<sup>1055</sup> Chu (Meta Platforms (formerly Google)) Deposition 212:18-213:2.

<sup>1056</sup> See, e.g., Google, “Play Payments Policy,” October 31, 2019, GOOG-PLAY-001088669.R-687.R, p. 5; Google, “Update on Play,” GOOG-PLAY-000604882-902, pp. 1-2 (explaining the vagueness in the policy language and how certain developers, such as Spotify, have used the loophole to bypass Google Play Billing); Emails between Google personnel, “Subject: Re: Spotify Question,” March 11-24, 2017, GOOG-PLAY-000257629-633, pp. 2-3; Google, “Play Billing Policy,” August, 2019, GOOG-PLAY-003334312-347, p. 3 (among others, listing Hulu, Spotify, and Netflix as apps that bypassed the payment policy because of the policy language vagueness).

<sup>1057</sup> See, e.g., Google, “Play Payments Policy,” October 31, 2019, GOOG-PLAY-001088669.R-687.R, at 673.R (recognizing that “Ambiguous payment exemption for apps causes confusion/inconsistency”).

<sup>1058</sup> Google, “Play Billing Policy,” August, 2019, GOOG-PLAY-003334312-347, p. 5. See also Google, “Play update for Alphabet Board,” Q2, 2020, GOOG-PLAY-000559379.R-384.R, p. 4 (noting that “[d]evelopers have been increasingly vocal about their concerns with platforms (iOS App Store, Google Play) charging 30% revenue share.”).

- “We want to give users choice of payment;”
- “We have better FOP [forms of payment<sup>1059</sup>] coverage; GPB won’t work for our users unless you catch up;”
- “Our margins are too thin to support even 15% revenue share;”
- “We think Google Play’s value to us declines as our brand and repeat buyers grow.”

511. Moreover, Paul Feng, a Product Manager for Play Monetization at Google, has testified that developers have voiced concerns regarding Google Play Billing in relation to integration of payments across services and service fees.<sup>1060</sup>

512. [REDACTED] Tinder, and Bandcamp are a few examples of apps whose developers have demonstrated a preference for alternative in-app billing services. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]<sup>1061</sup>

513. [REDACTED]

[REDACTED]

[REDACTED]<sup>1062</sup> Sometime in 2020, Google offered [REDACTED] as low as [REDACTED] and [REDACTED] counteroffer was

<sup>1059</sup> Feng (Google) Deposition, p. 315 (“Q Next concern is ‘We have better FOP coverage.’ That means form of payment; right? A Yes”).

<sup>1060</sup> Feng (Google) Deposition, pp. 180-181. Google identified and provided a list of developers that “have requested to use a non-Google Play billing system in their apps for in-app purchases. *See*, Google, “Defendants’ Responses and Objections to Consumer Plaintiffs’ First Set of Interrogatories” *State of Utah et al. v. Google LLC et al.* United States District Court for the Northern District of California San Francisco Division, Case No. 3:21-cv-05227-JD, October 11, 2021, pp. 26-27.

<sup>1061</sup> Google, “Spotify – Next Steps,” December, 2020, GOOG-PLAY-006997722.C-751.C, p. 3. *See also*, Email from Rishi Chandra, Google, to Google personnel, March 21, 2017, GOOG-PLAY-000257629-633, p.2 (noting that [REDACTED] had been one of the main issues for Spotify).

<sup>1062</sup> Emails between Google personnel, “Subject: Re: Spotify,” October 22, 2014, GOOG-PLAY-004470512-516, pp. 1-2; Google, “Program Review Subscription Billing in Play Follow-Up,” February 2, 2015, GOOG-PLAY-000308691-692, p.1.

[REDACTED]<sup>1063</sup> Google offered Spotify a [REDACTED]  
 [REDACTED] in exchange for Spotify [REDACTED]  
 [REDACTED]  
 [REDACTED]<sup>1064</sup>

514. To date, Spotify has never used Google Play Billing for its Android app distributed on Google Play.<sup>1065</sup> For [REDACTED]  
 [REDACTED]<sup>1066</sup> Spotify described itself as a “sophisticated developer” with billing options in [REDACTED]  
 [REDACTED].” Spotify’s in-app billing solution has a [REDACTED] and offers [REDACTED]  
 [REDACTED]<sup>1067</sup>

515. [REDACTED] preferred its own payment processing system to Google Play Billing and was not convinced that even 15% commission was worth the incremental value that Google Play Billing might have provided. A Google presentation, dated August 2017, notes that in July, [REDACTED]  
 [REDACTED] [REDACTED]  
 [REDACTED]<sup>1068</sup> The same presentation, further notes that [REDACTED] needs to justify the 15% rev share versus their [REDACTED] of payment processing costs... [REDACTED] is] not sure it’s even possible for Google payment processing to be at par [with [REDACTED] own payment processing system].”<sup>1069</sup>

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<sup>1063</sup> Google, “Spotify – Next Steps,” December, 2020, GOOG-PLAY-006997722.C-751.C, at 723.C.

<sup>1064</sup> Google, “Spotify – Next Steps,” December, 2020, GOOG-PLAY-006997722.C-751.C, at 734.C.

<sup>1065</sup> [REDACTED] Deposition, pp. 26-27 (“Q. Prior to 2022, had [REDACTED] ever used Google Play billing? A. No. Perhaps to clarify, we do not today use Google Play Billing.”).

<sup>1066</sup> [REDACTED] Deposition, pp. 51-52.

<sup>1067</sup> [REDACTED] Deposition, pp. 83-84.

<sup>1068</sup> Google, [REDACTED] Code Yellow Proposal,” August, 2017, GOOG-PLAY-000262353.R-389.R, p. 5.

<sup>1069</sup> Google, [REDACTED] Code Yellow Proposal,” August, 2017, GOOG-PLAY-000262353.R-389.R, pp. 7-8.

As a result, in February 2021, Google described [REDACTED] status as “[a]igned on a consumption-only model.”<sup>1070</sup>

516. At the end of 2016, there was a growing concern at Google that Tinder, at the time “the only major dating app owned by the Match Group still exclusively using GPB and currently Play’s second highest grossing app,” might adopt additional billing options, or completely move away from Google Play Billing.<sup>1071</sup> As a result, Google was internally discussing the possibility to offer [REDACTED] commission to Tinder.<sup>1072</sup> Google recognized that in some ways Google Play Billing was inferior to the payment processing systems of larger services, such as Match Group: “The larger (most profitable) services like Match, Zoosk and eHarmony, began as web businesses (10 - 20 years ago) and are actually quite sophisticated in terms of churn-reduction, reengagement and buyer conversion. In some ways our billing platform is not as good as theirs currently are.”<sup>1073</sup> Specifically:

517. Tinder ran tests to compare Google Play Billing to their own payment system and were “[s]urprised” how well their payment system performed compared to Google Play Billing.<sup>1074</sup> In his May 2022 declaration, Peter Foster, General Manager, Global Advertising and Brand Solutions at Match Group, lists various ways in which Match Group’s payment systems “are better for customers and Match Group.”<sup>1075</sup> For example, “[u]nlike GPB, Match Group’s alternative

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<sup>1070</sup> Google, “Billing Policy Compliance,” January 2021, GOOG-PLAY-006817773.R-890.R, p. 81. For the meaning of “consumption-only,” see Feng (Google) Deposition, pp. 389-390 (“Consumption only is a way for developers selling digital goods to comply with Play’s billing policy, which is to just not sell anything in their app. So you can log in to an app and, you know, that’s it. Q So you can log into the app and you can consume things that you purchase; right? A Or it’s free or something like this. But if you are selling something, you can sell it on any of the numerous other possible ways that developers have to sell and still have a consume to Android. They can sell it on the web, their own website. They can sell it on another platform like iOS or PC or something like that. But they wouldn’t necessarily sell in the Play-distributed app.”).

<sup>1071</sup> Emails between Google personnel, “Subject: Re: Tinder and Google Play Billing [Concern],” December 16, 2016-June 27, 2017, GOOG-PLAY-000840773-782, p. 7.

<sup>1072</sup> Emails between Google personnel, “Subject: Re: Tinder and Google Play Billing [Concern],” December 16, 2016-June 27, 2017, GOOG-PLAY-000840773-782, p. 7. See also Samat (Google) Deposition, pp. 508-529.

<sup>1073</sup> Emails between Google personnel, “Subject: Re: Tinder and Google Play Billing [Concern],” December 16, 2016-June 27, 2017, GOOG-PLAY-000840773-782, p. 2.

<sup>1074</sup> GOOG-PLAY-002438751, p. 1.

<sup>1075</sup> Foster Declaration, pp. 16-20.

payment options offer users an easy checkout process... Match Group’s payment systems also support features that enhance the user experience and facilitate payments... GPB also limits apps’ ability to make special offers to its users... Google imposes a limit on the number of unique products and services that Match Group can offer... Match Group’s data shows that consumers prefer using Match Group’s payment options... Match Group has received numerous complaints resulting from transactions processed via GPB.”<sup>1076</sup> In addition, “Match Group’s remaining major brands (Match.com, PlentyOfFish and Meetic) have resisted adoption of GPB due to a robust existing payment infrastructure and then the lack of desire to pay the 30% rev share.”<sup>1077</sup>

518. In April 2019, Tinder removed Google Play In-App Billing as the default in favor of their own billing solution.<sup>1078</sup> In May 2022, after Match Group filed a complaint against Google, “alleging the company ‘illegally monopolized the market for distributing apps’ by requiring app developers to use Google’s billing system and then taking up to a 30% cut on any in-app purchases.” Google and Match Group reached an agreement that allows “its apps to remain on the Google Play Store while offering alternate payment systems.”<sup>1079</sup>

519. In spring 2022, Epic acquired Bandcamp, an online music platform.<sup>1080</sup> Epic wanted to use an alternative payment system for Bandcamp because “Google’s stricter in-app purchase requirements (which will demand that Bandcamp use Google’s billing system from June 1st) and delayed payments (from a maximum 48 hours to as long as 45 days) would cause ‘irreparable harm’

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<sup>1076</sup> Foster Declaration, pp. 16-20.

<sup>1077</sup> Emails between Google personnel, “Subject: Re: Tinder and Google Play Billing [Concern],” December 16, 2016–June 27, 2017, GOOG-PLAY-000840773-782, p. 7.

<sup>1078</sup> Google, “Google/Match Group Exec Summit,” August, 2019, GOOG-PLAY-002438751-754, p. 3.

<sup>1079</sup> Competition Policy International (CPI), “Google Allows Match to Use Alternate Payments as the[y] Head to Trial,” May 22, 2022, available at <https://www.competitionpolicyinternational.com/google-allows-match-to-use-alternate-payments-as-the-head-to-trial/> (hereafter “CPI (2022)”). *See also* “Stipulation and [Proposed] Order on Match’s Motion for Temporary Restraining Order,” *Match Group, LLC; Humor Rainbow, Inc; Plentyoffish Media ULC; and People Media, Inc. v. Google LLC; Google Ireland Limited; Google Commerce Limited; Google Asia Pacific PTE. Limited; and Google Payment Corp.*, United States District Court for the Northern District of California San Francisco Division, Case No. 3:22-cv-02746-JD, May 19, 2022.

<sup>1080</sup> Sisario, Ben, “Gaming Giant Behind Fortnite Buys Bandcamp, an Indie Music Haven,” *The New York Times*, March 8, 2022, available at <https://www.nytimes.com/2022/03/02/arts/music/epic-games-bandcamp.html>; Fingas, J., “Epic Games is Acquiring Music Marketplace Bandcamp,” *engadget*, March 2, 2022, available at <https://www.engadget.com/epic-games-acquires-bandcamp-173446180.html>.

to both Epic and musicians.”<sup>1081</sup> However, Epic games was worried that Google might pull the app from its platform if it used an alternative payment system.<sup>1082</sup> Consequently, it filed for a preliminary injunction to enjoin Google from “removing ... or otherwise making unavailable the app Bandcamp ... on the basis that Bandcamp offers in-app payments through means other than Google Play Billing.”<sup>1083</sup> On May 20, 2022, Google and Epic reached an agreement that allows Bandcamp to remain on the Google Play Store while offering alternate payment systems.<sup>1084</sup>

520. Google coerces developers to use Google Play Billing even though it recognizes that Google Play Billing may not be readily tailored to an app. For example, Google’s own app YouTube<sup>1085</sup> did not integrate with Google Play Billing because it lacked certain features.<sup>1086</sup> Eric Chu, Engineering Director for YouTube Commerce, testified: “[O]nce you moved to the platform [Google Play Billing], then there is potential limitation into what we can and cannot do... [S]ince Play Billing didn’t have all the features we need [*i.e.*, all the features that YouTube needs], we’re potentially at risk of losing features when we went to Play Billing.”<sup>1087</sup>

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<sup>1081</sup> Fingas, J., “Epic Asks Court to Stop Google’s Removal of Bandcamp from the Play Store (updated),” *engadget*, April 29, 2022, available at <https://www.engadget.com/epic-preliminary-injunction-google-bandcamp-app-151821052.html>.

<sup>1082</sup> Fingas, J., “Epic Asks Court to Stop Google’s Removal of Bandcamp from the Play Store (updated),” *engadget*, April 29, 2022, available at <https://www.engadget.com/epic-preliminary-injunction-google-bandcamp-app-151821052.html>.

<sup>1083</sup> “Joint Stipulation and [Proposed] Order Regarding Epic Games, Inc.’s Request for Preliminary Relief,” *Epic Games Inc. v. Google LLC et al.*, the United States District Court for the Northern District of California San Francisco Division, Case No. 3:20-cv-05671-JD, May 20, 2022 (hereafter “Epic v. Google Re. Bandcamp”).

<sup>1084</sup> Epic v. Google Re. Bandcamp.

<sup>1085</sup> YouTube offers paid services including YouTube Premium, which allows users to view videos on the platform ad-free in addition to other features, and YouTube TV, which enables users to stream live content from cable channels and networks using an internet connection. See Moore, Ben, “YouTube Premium vs. YouTube TV: What’s the Difference?” *PCMag*, August 5, 2021, available at <https://www.pcmag.com/how-to/youtube-premium-vs-youtube-tv-whats-the-difference>.

<sup>1086</sup> Google, “Play Payments Policy,” October 31, 2019, GOOG-PLAY-001088669.R-687.R, at 673.R.

<sup>1087</sup> Chu (Meta Platforms (formerly Google)) Deposition, pp. 220, 223, and 224; Messages between Eric Chu and Eunice Kim, Google personnel, June, 6, 2020, GOOG-PLAY-003600814-816.



521. Google's conduct also prevented independent app stores from scaling an open-source, cross-app store in-app billing solution called "OpenIAB."<sup>1088</sup> OpenIAB gave developers the ability to offer in-app purchases through multiple Android app stores with an "open source library" that allowed developers to build "one APK [that] will work in all the stores and automatically use the right in-app purchase API under each store," and OpenIAB had its own "open in-app billing API that stores could implement to support all the built APK files using this library."<sup>1089</sup> Android app stores Appland, Aptoide, AppMall, SlideME, and Yandex.Store had all signed on to support OpenIAB, which was also offering in-app billing services compatible with Google Play, Samsung Apps (the precursor to the Galaxy Store), the Nokia Store, and the Amazon AppStore.<sup>1090</sup> The OpenIAB project's goal was overcoming the additional engineering effort required to build different versions of an app for each in-app billing solution from each Android app store.<sup>1091</sup> If realized, The OpenIAB mechanism "create[s] one final in-app billing mechanism that's compatible across all the different stores. And that would resolve this fragmentation issue," as SlideME's CEO explained.<sup>1092</sup>

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<sup>1088</sup> Christopoulos Deposition, p. 58 ("Q. The third bullet point says, quote, Move toward implementing OpenIAB For in-app payments for multiple stores, including SlideME, Amazon, Samsung and others was OpenIAB? A. Yes. It's what we talked about before. OpenIAB was an initiative by this group of developers or teams – and we were involved with it – to be able to combat this fragmentation problem that Google was causing. And this was to- it's an open in-app billing system. The words say it. The title says it."); 92:5-16 ("A lot of effort, a lot of development and a lot of time wasted, and the end result was only AppDF made it through. OpenIAB didn't make it through. And I think one of the reasons was because of changes of Google. If Google had to make changes all the time, it was always playing catching up and always updates and then developers have update and would become a nightmare and adding more to the fragmentation problem instead of trying to resolve it." [as stated]).

<sup>1089</sup> OpenIAB, Github (last accessed Sept. 24, 2022), <https://github.com/onepf/OpenIAB>; Christopoulos Deposition, pp. 58-59 ("It's basically a developer would take this Open[IAB] module or SDK, use that within their app – their Android app when they develop it, and this one build – final build of the Android app will be - - would be able to be distributed to the different app stores out there that were supported by Open[IAB], including the Google Play Store or Android Market back then – I'm not sure of the time line – SlideME, Amazon and so forth. So it was a nice initiative."); Christopoulos Deposition, pp. 91-92 ("The other initiative, which was OpenIAB, which means open in-app billing, was to be able to handle in-app billing for freemium apps, as we spoke about before, through an open standard. In other words, one app build that would work across the different app stores – SlideME, Amazon, Google Play and so forth – that, again, reducing the fragmentation problems. So we wanted to address this.").

<sup>1090</sup> OpenIAB, Github (last accessed Sept. 24, 2022), <https://github.com/onepf/OpenIAB>; Christopoulos Deposition, pp. 58-59.

<sup>1091</sup> PX1586, "Yandex: One Platform Foundation," SLIDE-PLAY-0066, at 099 (native).

<sup>1092</sup> Christopoulos Deposition, pp. 111-112; PX1586, "Yandex: One Platform Foundation," SLIDE-PLAY-0066, at 101 (native).

5. *Google's Anticompetitive Tying Arrangement Affects Nearly All Developers and Foreclosed Rival In-App Billing Services Providers*

522. Google's rules have forced nearly all developers to use Google Play Billing, with few exceptions, therefore foreclosing a substantial part of the Android In-App Billing Services Market for rival in-app billing service providers. For example, in September 2020, Sameer Samat, Vice President Product Management at Google, posted on Google's blog:<sup>1093</sup>

Less than 3% of developers with apps on Play sold digital goods over the last 12 months, and of this 3%, the vast majority (nearly 97%) already use Google Play's billing. But for those who already have an app on Google Play that requires technical work to integrate our billing system, we do not want to unduly disrupt their roadmaps and are giving a year (until September 30, 2021) to complete any needed updates. And of course we will require Google's apps that do not already use Google Play's billing system to make the necessary updates as well.

523. Moreover, the share of developers who use Google Play Billing exclusively could have been even higher than indicated in the previous paragraph since, according to a Google ordinary course document, "99% of devs [are] not on non-GPB" (*i.e.*, 99% of developers use Google Play Billing exclusively).<sup>1094</sup>

524. Given Google Play Store's dominance in the Android App Distribution Market and Google Play Billing's very high usage among developers who distribute apps on the Google Play Store, Google has a substantial share of the Android In-App Billing Services Market. Indeed, as estimated in Section VI.C, in 2019 Google Play Billing's market share was approximately 87% in terms of revenues. Thus, I conclude that Google's tying arrangement has affected a not insubstantial volume of commerce in the tied product market.

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<sup>1093</sup> Samat, Sameer, "Listening to Developer Feedback to Improve Google Play," *Android Developers Blog*, September 28, 2020, available at <https://android-developers.googleblog.com/2020/09/listening-to-developer-feedback-to.html>.

<sup>1094</sup> Google, "Checkin with Hiroshi," September 13, 2019, GOOG-PLAY-007346993-049, at 002.

6. *Conclusion: Google Successfully Imposed an Anticompetitive Tie*

525. Based on the evidence described above, I find that: (i) Google Play Billing is a product distinct from the Google Play Store; (ii) Google has imposed rules requiring developers to use Google Play’s Billing for all subsequent in-app purchases of digital content in the apps that were downloaded through Google Play; (iii) these rules have been actively enforced by Google; (iv) developers have been coerced into using Google Play Billing for purchases of in-app digital content as a condition to distribute on Google Play Store; (v) developers have voiced concerns regarding Google Play Billing and, in some instances, have preferred alternative in-app billing services; and (vi) the rules have foreclosed a substantial part of the market for rival in-app billing service providers. Thus, this tying arrangement has affected a substantial part of the Android In-App Billing Services Market. I have also demonstrated that Google’s tie has created substantial foreclosure to competing Android in-app billing service providers.

**B. Google’s Anticompetitive Conduct in the In-App Billing Services Market Has Allowed it to Impose Supracompetitive Commissions**

526. Google’s anticompetitive tying arrangements have allowed it to charge supracompetitive commissions. As I explained in Section VI, with a few exceptions, Google charges a 30% commission for paid apps and in-app digital content sold through the Google Play Store.<sup>1095</sup> In what follows, I show that the commission on the Android In-App Billing Services Market would have been lower under a competitive but-for world in which Google did not extend

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<sup>1095</sup> Google, “Google Play Console Help, Service fees,” available at [https://support.google.com/googleplay/android-developer/answer/112622?hl=en&visit\\_id=637872098045257136-3276584470&rd=1](https://support.google.com/googleplay/android-developer/answer/112622?hl=en&visit_id=637872098045257136-3276584470&rd=1). There are a few exceptions: (i) starting July 1, 2021, the service fee “for each developer will be 15% for the first \$1M (USD) of earnings you make each year when you sell digital goods or services;” (ii) for automatically renewed subscriptions the service fee is 15%; (iii) “As of December 18, 2021, for developers who offer an alternative in-app billing system in addition to Google Play’s billing system for transactions with users in South Korea... the service fee for such transactions using the Additional Billing System is equal to the service fee applicable for transactions via Google Play’s billing system reduced by 4%.” See also Google Play Console Help, Changes to Google Play’s service fee in 2021, available at <https://support.google.com/googleplay/android-developer/answer/10632485>. Also, in March 2022, Spotify announced that “[u]sers who’ve downloaded Spotify from the Google Play Store will be presented with a choice to pay with either Spotify’s payment system or with Google Play Billing.” See Spotify, “Spotify and Google Announce User Choice Billing,” March 23, 2022 available at <https://newsroom.spotify.com/2022-03-23/spotify-and-google-announce-user-choice-billing/>.

its market power from the tying to the tied product, hence not effectively foreclosing the Android In-App Billing Services Market. Moreover, the commission would likely have been lower as enhanced competition on the In-App Billing Services Markets would potentially lead to “laddering up,” *i.e.*, enhanced distribution and discoverability for apps, as discussed in section VII.B, hence enhancing competition in the Android App Distribution Market as well.

*1. Google Has Charged Commissions Substantially Above Its Marginal Costs and Has Offered Lower Commissions on Several Occasions*

527. In section VII.B.1, I explained that Google has charged a supracompetitive commission that is substantially above marginal costs. In addition, I explained that Google was able and willing to substantially decrease commission in the face of some limited competitive pressures or other goals related to growth and success of its business.

528. For example, in 2016, Google created the Living Room Accelerator Program (LRAP) to “*drive (i) Play billing adoption, (ii) accelerate living room product integrations and (iii) align with M&E market terms.*”<sup>1096</sup> The LRAP reduces Google’s commission to [REDACTED] for developers of subscription video streaming apps, given that they *maintained the use of Google Play Billing* and “*key living room integrations.*”<sup>1097</sup> Jamie Rosenberg, then VP of Strategy and Operations for Platforms and Ecosystems at Google, testified that “one of the goals of the LRAP program was to *try and persuade these video content applications to adopt Google Play billing.*”<sup>1098</sup>

529. In 2020, Google proposed to extend this program and create the LRAP++, as [REDACTED] was “insufficient for select media sub-verticals” such as live TV, third party channel aggregators, and transactional movie and TV sales. As a result, Google believed there was an “[i]ncreased risk of *agitation* if Google enforce[d] [its] policy with no commercially viable option for alignment, *particularly in verticals that compete with IP services.*”<sup>1099</sup> Thus, the LRAP++ would create an

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<sup>1096</sup> Google, “Program Hug Extension to Strategic App Developers (“App Accelerators”),” March 5, 2020, GOOG-PLAY-001291192.R-232.R (emphasis added).

<sup>1097</sup> GOOG-PLAY-001291192.R.

<sup>1098</sup> Rosenberg (Google) Deposition, p. 264 (emphasis added).

<sup>1099</sup> GOOG-PLAY-001291192.R, at 208.R and 210.R (emphasis added).

██████████ revenue share tier for live TV providers offering live content catalog feed, ATV Live integrations, and CrOS optimization, in addition to existing LRAP requirements.<sup>1100</sup> Google has stated in a sworn submission in this case that LRAP++ is one of the programs that U.S. developers participate in and that ██████████ has participated in the program since June 30, 2021.<sup>1101</sup>

530. The App Velocity Program (AVP) was approved for 2021-2023 and consists of “[d]eals offered to partners with sizeable Google business to deepen partnership and improve sentiment around Play value proposition.”<sup>1102</sup> The AVP provides ██████████ ██████████ in exchange for the exclusive use of Google Play Billing, product integrations, and parity. Therefore, AVP benefits are effective for developers after compliance with these terms, particularly after being compliant with Google Play Billing.<sup>1103</sup> The commission offered by AVP to qualifying developers reads as ██████████ where ██████████ ██████████<sup>1104</sup>

531. Under the Games Velocity Program (GVP), in addition to Google’s concerns that large developers would develop their own distribution systems, Google was concerned about developers with “their own billing solutions...capable of going off Play billing,”<sup>1105</sup> which would have a negative financial impact on Google.<sup>1106</sup> Google characterized the commission offered to GVP participants as ██████████ where “Play re-invests margin to drive partner business growth on Play and encourage partners to lean into Google.”<sup>1107</sup> In 2020, Google proposed

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<sup>1100</sup> GOOG-PLAY-001291192.R, at 208.R and 210.R.

<sup>1101</sup> “Defendants Google LLC, Google Ireland Limited, Google Commerce LTD., Google Asia Pacific PTE. LTD. and Google Payment Corp.’s Answers and Objections to Developer Plaintiffs’ First Set of Interrogatories to Defendants,” the United States District Court for the Northern District of California San Francisco Division, Google Play Store Developer Antitrust Litigation, Case No. 3:20-cv-05792-JD, July 6, 2021, at pp. 13-15.

<sup>1102</sup> Google, “Apps Deal Programs: AVP & Accelerators,” November 2020, GOOG-PLAY-004684227.R-239.R, at 228.R and 237.R.

<sup>1103</sup> GOOG-PLAY-004684227.R, at 228.R and 237.R.

<sup>1104</sup> Google, “Google play Partner Deal Program Overview,” April 2021, GOOG-PLAY-006998204.R-211.R, at 206.R.

<sup>1105</sup> Google, “Alliance 2021 Planning (WIP),” GOOG-PLAY-000233314-319.

<sup>1106</sup> Email from Mike Herring, Google, to Ruth Porat, CFO at Google, “Subject: Briefing Note on Hug – for BC on 4/9,” April 8, 2019, GOOG-PLAY-000000807-815, at 808 ██████████ annually in ██████████ years ██████████ cumulative ██████████).

<sup>1107</sup> GOOG-PLAY-006998204.R, at 206.R.

an expansion to GVP to target what it considered “strategic app developers,” such as Match, Tinder, [REDACTED] and [REDACTED] among others, by offering a [REDACTED] to “mitigate impact of transition to Play Billing.” As a result of this expansion, Google hoped to “[b]oost Play Billing adoption.”<sup>1108</sup>

532. In [REDACTED], Google offered Spotify [REDACTED] [REDACTED] [REDACTED] counteroffer was a [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] <sup>1109</sup> Google offered [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] <sup>1110</sup> Recently, as discussed above, Google has offered a User Choice Billing pilot with [REDACTED] as its initial account.

533. Finally, Google has acknowledged that it would have to react to possible competitive pressures. For example, a Google presentation from March 2019 notes that, if “GPB becomes non-exclusive [allowing for 3rd party payments]... GPB begins to compete on price/services for business across digital and non-digital goods...” and GPB would “[l]ikey ‘race to the bottom’ on pricing vs Stripe, competitors.”<sup>1111</sup> A Google presentation from September 2019 notes that “Play Billing could become optional for all devs, including games... Policy change is critical and we will need to make a public statement: Will need to defend 30% across the board.”<sup>1112</sup>

534. Thus, the evidence above indicates Google’s ability and willingness to decrease commission substantially in the face of some limited competitive pressures or other goals related to

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<sup>1108</sup> GOOG-PLAY-001291192.R, at 202.R-206.R.

<sup>1109</sup> Google, [REDACTED] – Next Steps,” December 2020, GOOG-PLAY-006997722-751, at 723.

<sup>1110</sup> GOOG-PLAY-006997722, at 734.

<sup>1111</sup> Google, “Exploring new business models,” March 2019, GOOG-PLAY-000542516.R-535.R, at 532.R.

<sup>1112</sup> Google, “Magical Bridge & Play Billing Review – 9/13/2019,” September 13, 2019, GOOG-PLAY-007173383-451, at 435.

growth and success of its business (and in most cases, in the face of threat to its tying arrangement), indicating that its 30% commission for GPB is supracompetitive.

## 2. *Competitive But-For World Commission*

535. As the evidence above indicates, (i) Google’s 30% commission is supracompetitive; and (ii) Google was able and willing to substantially decrease commissions in the face of competitive pressures or other goals related to growth and success of its business. Thus, it is my opinion that, in a competitive but-for world in which Google had not pursued an anticompetitive tying strategy and hence did not foreclose a substantial part of the Android In-App Billing Services Market to potential competing in-app billing service providers, there would be enhanced competitive pressure on Google. Many developers would become more price sensitive as they would have more alternatives from which to choose and switch if desired. Developers would have an increased ability to find a substitute to Google’s own payment system and, according to the evidence above, this would discipline Google’s price setting power and hence its commission.

536. The lower commissions that Google has offered to various developers over time, as described above, thus serve as upper bounds on what the commissions would look like in a competitive but-for world because in the competitive but-for world competitive pressure on Google would be what Google has faced so far in the actual world plus additional pressure due to enhanced competition. In addition, the commissions would likely be lowered on both Android App Distribution and In-App Billing Services Markets as enhanced competition on the In-App Billing Services Markets would potentially lead to “laddering up” as discussed in section VII.B, hence enhancing competition and lowering commissions on the Android App Distribution Market as well.

537. Given the above evidence, I take 15% as an upper bound on the commission in a but-for world in which Google does not pursue an anticompetitive tying strategy: (i) In response to competitive pressures (*e.g.*, developers that could avoid Google Play Billing and use alternative in-app billing service providers), Google negotiates lower service fees to provide incentives to



developers to adopt Google Play Billing and comply with Google’s payment policies;<sup>1113</sup> (ii) Generally, these service fee rates have been 15% ( [REDACTED] [REDACTED] [REDACTED] );<sup>1114</sup> (iii) Google identified 4 programs, LRAP, LRAP++, ADAP, and SwG, in response to an interrogatory asking Google to “[c]onfirm whether Google has entered into ANY agreements with ANY U.S. APP DEVELOPERS with terms that deviate from the standardized terms in Google’s Developer Distribution Agreement. IDENTIFY all such occurrences, together with DOCUMENTS RELATED TO such contracts AND negotiations”<sup>1115</sup> and the maximum service fee offered by those programs is 15%. Moreover, I am not aware of any evidence that Google’s margins on the Google Play Store under these programs were negative.

### 3. *Competitive But-For World Commissions Are In-Line with Commissions on Other App Stores*

538. In section VII.B, I explained that comparing Google’s commission in the Google Play Store to commissions offered by PC app stores is informative about whether Google’s commissions for Android App Distribution and In-App Billing Services through the Google Play Store are supracompetitive. In addition, I showed that commissions of some major PC app stores are bounded above by Google’s commission of 30% and the lower commissions are in-line with the commissions that Google has offered to various price sensitive developers over time.

539. In section VII.B I also showed that commissions offered by alternative Android app stores are also bounded above by 30% and are generally below 30%, which provides yet another indication that mobile app stores are able and willing to decrease their commissions below 30%.

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<sup>1113</sup> GOOG-PLAY-001291192, at 208.R and 210.R.

<sup>1114</sup> GOOG-PLAY-006997722, at 723; GOOG-PLAY-001291192, at 208.R and 210.R.

<sup>1115</sup> “Defendants Google LLC, Google Ireland Limited, Google Commerce LTD., Google Asia Pacific PTE. LTD. and Google Payment Corp.’s Answers and Objections to Developer Plaintiffs’ First Set of Interrogatories to Defendants,” the United States District Court for the Northern District of California San Francisco Division, Google Play Store Developer Antitrust Litigation, Case No. 3:20-cv-05792-JD, July 6, 2021, at pp. 12-14.

4. *Direct Discounts to Consumers*

540. In section VII.B, I explained that providing direct discounts to consumers is an effective way to retain or acquire consumers when faced with competitive pressures. Google and developers of other app stores have acknowledged this and have offered discounts to consumers in the face of competitive threats.

**C. Google's Anticompetitive Conduct in the Android In-App Billing Services Market Has Lowered Output and Harmed Innovation**

541. In addition to allowing Google to charge supracompetitive commissions, it is my opinion that Google's tying has also resulted in reduced output and innovation. In a competitive but-for world, in which the Android In-App Billing Services Market were not subject to tying arrangements, there would be higher output and greater innovation. The output would be higher because more developers would be willing to enter the market as their expected profits from doing so would be higher given the lower commissions set by Google, and billing services options available on the market. This would translate into increased supply (*i.e.*, more apps and in-app content available from developers).<sup>1116</sup> Consequently, there would be a lower equilibrium price of apps and in-app content and higher equilibrium output.<sup>1117</sup>

542. In section VII.C, I estimate the increase in output and varieties (number of apps) in a competitive but-for world using my model. Those output and variety increases would be similar if Google did not impose anticompetitive tying arrangements. In my model, developers would create new apps if it became profitable to do so. In a competitive but-for world, Google's commission would be lower and direct discounts to consumers would be higher hence making it more profitable for developers to create and post new apps on Google Play. In section VII.C, I also show that lower commissions would free up financial resources for developers to invest in capacity and innovation.

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<sup>1116</sup> Mankiw, N. Gregory, *Principles of Microeconomics*, Fifth Edition, South-Western CENGAGE Learning, 2008 (hereafter "Mankiw (2008)"), pp. 304-305.

<sup>1117</sup> See Appendix F where I develop a model underlying my damages calculations. The model provides a mechanism through which lower commission translates into increased supply of apps and in-app content, resulting into lower equilibrium price and higher output.

543. Evidence in the record supports my opinion that absent Google’s anticompetitive conduct, there would be increased innovation and more features of payment solutions available to developers on Google Play.

544. Payment services providers other than Google Play Billing have various features that are unavailable to app developers required to use Google Play Billing. For example, “Google Play’s billing system is a service that enables you to sell digital products and content in your Android app.”<sup>1118</sup> In contrast, other payment service providers are available across multiple platforms - Amazon Pay, Braintree, PayPal, Square, and Stripe are a few examples of providers that are also available on iOS.<sup>1119</sup> In addition, Google Play Billing does not process payments for physical goods.<sup>1120</sup> In contrast, Amazon Pay, Braintree, PayPal, Square, and Stripe do.<sup>1121</sup> Furthermore, developers, including [REDACTED], and Tinder have voiced concerns that they “want to give users choice of payment.”<sup>1122</sup> [REDACTED], and Match have voiced concerns that “[w]e have better FOP [form of payment] coverage; GPB won’t work for our users unless you catch up.”<sup>1123</sup> These features of a billing service (a better FOP coverage and working on multiple platforms and for both physical and digital good purchases) would likely be

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<sup>1118</sup> Google, “Google Play’s billing system overview,” June 29, 2022, available at <https://developer.android.com/google/play/billing>.

<sup>1119</sup> Amazon Pay, “Support,” available at <https://www.amazonpay.in/help/202030010>; Braintree, “Accept and process payments online,” available at <https://www.braintreepayments.com/products/braintree-direct>; PayPal, “Add payment checkout to an app with PayPal Mobile Checkout SDK,” available at <https://developer.paypal.com/limited-release/paypal-mobile-checkout/>; Square, “Payments,” available at <https://developer.squareup.com/docs/payments>; Stripe, “Accept a payment using Stripe Elements and the Charges API,” available at <https://stripe.com/docs/payments/accept-a-payment-charges>.

<sup>1120</sup> Google, “Google Play Developer Distribution Agreement,” available at <https://play.google.com/about/developer-distribution-agreement.html>. *See also* Play Console Help, “Payments,” available at <https://support.google.com/googleplay/android-developer/answer/9858738>.

<sup>1121</sup> Stripe, “A complete payment platform, engineered for growth,” available at <https://stripe.com/en-gb-be/payments>; PayPal, “Seller Protection for Merchants,” available at <https://www.paypal.com/us/webapps/mpp/security/seller-protection>; Amazon Pay, “For Merchants - Make Amazon’s customers your customers,” available at <https://www.amazonpay.in/merchant>; Braintree, “Accept and process payments online,” available at <https://www.braintreepayments.com/products/braintree-direct>; Square, “Add a Physical Item to Square Online,” available at <https://squareup.com/help/us/en/article/7046-add-a-physical-product>.

<sup>1122</sup> Google, “Play Billing Policy,” August 2019, GOOG-PLAY-003334312-347, at 316.

<sup>1123</sup> GOOG-PLAY-003334312, at 316.

desirable for a developer who sells both digital and physical goods, operates on multiple platforms, or wants to improve customer reach.

545. Google Play Billing is also not tailored to developers' specific needs and requirements and can be too generic. An example is Google's own YouTube which has used its own payment solution instead of Google Play Billing. Eric Chu, former Engineering Director at Google, testified that Google Play was a "generic" system while YouTube had "specific customizable needs" and it would take a lot of work for Google Play Billing to meet YouTube-specific requirements.<sup>1124</sup> Indeed, in July 2020, YouTube discussed 66 features of its payment solution with Play team and determined that only 20 of those features were fully supported by Play.<sup>1125</sup>

546. In Section VIII.A.4, I also discuss examples of various developers (including [REDACTED] and Tinder) that have complained about Google Play Billing, outperformed it with their own billing service solutions, and preferred their own or other billing service providers.

547. Finally, requiring app developers to use Google Play Billing would also harm app developers' incentives to invest in and innovate their own payment solutions. For example, Eric Chu testified that if YouTube were to abandon its own billing system and adopt Google Play Billing, then this would happen at the expense of less innovation of YouTube's own billing system:<sup>1126</sup>

Q And here you describe that meeting, and then, in the middle of the last paragraph, you say -- beginning with the word 'Integration' you say, quote: 'Integration even at the minimum level of UX mirroring with backend data integration will significantly limit YouTube's ability to innovate + significant' engineering 'efforts at the expenses of moving our paid

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<sup>1124</sup> Chu (Meta Platforms (formerly Google)) Deposition, p. 282: ("Q. And if you are trying to -- and it was going to take a lot of work for a Play system that was a generic system that worked for a lot of third parties to meet the needs of YouTube which had specific customizable needs, correct? MS. NARANJO: Object to form. A. That was my general assessment back in July of 2020 when we were at the beginning of the conversation with the Play team.").

<sup>1125</sup> Email from Eric Chu, Engineering Director at Google (former), to Prachi Gupta, Google, Will Aldrich, Google, and Eunice Kim, Google, "Subject: Draft email to prep John," July 31, 2020, GOOG-PLAY-001741853-854; Chu (Meta Platforms (formerly Google)) Deposition, pp. 276-279.

<sup>1126</sup> Chu (Meta Platforms (formerly Google)) Deposition, pp. 219-223; PX 316, GOOG-PLAY-003600814, at 816; *see also* Google, "Buy Flow Discussion," GOOG-PLAY-001088593-601, at 596 (noting that switching to Google Play Billing "[l]imits innovation in relation to billing, creating a dependency between Play and YouTube for launching new billing features").

business forward.' Do you see that? A Yeah. Q And what you're saying here is that if your -- strike that. What you're saying is that if YouTube has to adopt Google Play Billing, that will harm YouTube's and your organization's ability to innovate on billing and would require significant engineering expense for the migration, correct? MS. NARANJO: Object to form. THE WITNESS: What I'm trying to communicate was that if my team had to spend time to migrate rather than innovate, it has a huge updated cost. At the same time, since Play Billing didn't have all the features we need, we're potentially at risk of losing features when we went to Play Billing.

548. In a June 2020 internal correspondence, discussing YouTube’s potential migration to Play Billing, Chu wrote that “[i]ntegration even at the minimum level... will significantly limit YouTube’s ability to innovate... Deeper integration will be extremely costly... Furthermore, it will most likely result in features regression for YouTube...”<sup>1127</sup> Google documents also reflect that the longer developers keep using billing services other than GPB, “the more they invest in their own billing solution.”<sup>1128</sup>

549. As discussed in Section VIII.B.1, Google offered

Google offered lower commission and a more advanced and flexible version of GPB when faced with a threat of Spotify going consumption-only. This serves as an evidence of Google improving the quality of its billing services as a result of threat of losing a customer.

550. In summary, the evidence suggests that there are billing service providers (or developers having capability to provide billing services) that have features and quality that Google Play Billing does not have. Moreover, those providers are better tailored to various developer needs

<sup>1127</sup> GOOG-PLAY-003600814, at 816.

<sup>128</sup> Google, “Accelerators Proposal to decouple from Policy Enforcement,” GOOG-PLAY-000560166-172 (“The more time developers spend de-integrated, the more they invest in their own billing solution.”), at 166.

<sup>1129</sup> GOOG-PLAY-006997722, at 734.

<sup>1130</sup> GOOG-PLAY-006997722, at 725.

as compared to Google Play Billing. However, since those providers are being foreclosed by Google's anticompetitive tie, developers are not enjoying all the benefits of additional features offered by those providers. Finally, Google's anticompetitive tie harms innovation in billing services as it disincentivizes investment and development in this sphere - further limiting the potential variety and quality of billing services to the developers.

## **IX. Google's Anticompetitive Conduct Has Harmed Consumers in the U.S.**

551. Having established that Google's anticompetitive conduct harmed competition, I now present an economic model that can be used to quantify the extent to which Google's conduct harmed consumers. I explain my theoretical model, describe the components I use to estimate the model, and present a summary of the damages in the Plaintiff States and nationwide during the period from August 16, 2016 to May 31, 2022 (the date of the last transaction in the Google transaction data). I also extrapolate the results through June 5, 2023, the date on which trial in this case is set to begin. Damages by Plaintiff State/year are presented in Appendix I.

### **A. Model of Competition**

552. I develop a model of monopolistic competition between apps, based on Church and Gandal (1993), in which developers supply apps and in-app content and compete on prices charged to consumers.<sup>1131</sup> Entry of apps determines the number of apps in an app store. The model is developed and explained in more detail in Appendix F.

553. The model has three stages and is in the tradition of models of monopolistic competition.<sup>1132</sup> Models of monopolistic competition feature a large number of firms that supply differentiated products to consumers. The firms have a degree of market power because their products are unique in certain aspect (they are differentiated), *i.e.*, consumers would not be willing

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<sup>1131</sup> Church, Jeffrey and Neil Gandal. "Complementary network externalities and technological adoption," *International Journal of Industrial Organization* 11, 1993, pp. 239-260 (hereafter "Church and Gandal (1993)").

<sup>1132</sup> See *e.g.* Dixit and Stiglitz (1977); Church and Gandal (1993); Nair, Harikesh, Pradeep Chintagunta, and Jean-Pierre Dube, "Empirical Analysis of Indirect Network Effects in the Market for Personal Digital Assistants," *Quantitative Marketing and Economics*, 2, 2004, pp. 23-58 (hereafter "Nair et al (2004)").

to fully substitute to other products in response to the price changes. The degree to which consumers would be willing to substitute to other products is one determinant of firms' market power. In the long run, firms enter or exit depending on the cost of entry. Firms keep entering up to the point when it is no longer profitable for additional firms to enter the market. This further drive down firms' market power and prices.

554. In my model, in the first stage, the app developers make a decision to create an app to post on the platform or not to do so (entry decision). If an app is posted then, in the second stage, the app developer sets the app price (pricing decision). In the third stage, the consumer decides how many transactions to make with app developers who have posted apps on the platform. The consumer takes app prices, the number of available apps on the market, and Google's direct discounts to consumers as given when making a choice of how much to transact at each app, *i.e.*, how to allocate her budget across various apps. This determines consumer's demand for apps. In the second stage, when an app developer makes her pricing decision, she takes demand and the commission rate as given and sets price to maximize profits. At the point of making the entry decision, the app developer compares its fixed cost of making the app to the expected profits from the second and third stages of the model. The app developer enters if the expected profits cover its fixed cost. As more apps decide to enter, the expected profits to each app falls (because competition drives prices down and because more entrants means each captures smaller market share).

555. The model can be used to quantify two separate effects of Google's conduct, as compared to the but-for competitive world, and the associated damages: (i) the direct effect of an inflated commission and later-introduced Play Points on prices (overcharge effect); and (ii) the consumer welfare lost through decreased app variety while holding the app and in-app content prices at the actual world level (variety effect). In addition, I calculate (iii) the combined welfare effect of an inflated commission and later-in-time Play Points accounting for both the overcharge and variety effects.

*1. Direct Effect of Lower Commissions and Earlier Introduction of Play Points on Prices*

556. The overcharge effect results from a lower commission and from the earlier introduction of Play Points given to consumers in the hypothetical world absent Google's



anticompetitive conduct. A lower commission charged by Google can affect the prices consumers pay for apps and in-app content through two mechanisms. The first results from a decreased commission causing marginal revenue to rise relative to marginal cost. In other words, app developers' margins increase as the commission decreases. As a result of the lower commission, a profit-maximizing developer would want to reduce price. I refer to this as a direct effect of a lower commission on prices. The second mechanism is the downward pressure on prices caused by new entry. All else being equal, a lower commission implies higher revenue per unit sold, and thus, higher expected profits for developers, which facilitates entry of more apps. Consequently, increased entry implies (i) a greater variety of apps and higher number of successful apps; and (ii) fiercer competition, which leads to lower prices. Conservatively, my overcharge damages calculation accounts only for the first of these two mechanisms, *i.e.*, the direct effect as a result of marginal revenue becoming higher than marginal cost if Google's commission were to decrease. Additionally, the earlier introduction of Play Points reduces the final prices that consumers pay, and hence, affects the overcharge to consumers directly. My overcharge calculation accounts for this effect.

557. I can solve the model to obtain a but-for price per transaction that consumers would pay after accounting for Google's but-for commission and price discount (Google's but-for price discount accounts for the but-for earlier introduction of Play Points); subtract that but-for price from the actual price after Google's actual price discount; and divide by the actual price after Google's actual price discount to get the percentage overcharge. Finally, I multiply the percentage overcharge by the net consumer spend (netting out Google and developer discounts) over the damages period (August 16, 2016 – June 5, 2023) to calculate damages due to this effect. The overcharge that I calculate as a result of the lower commission in the but-for world equals the difference in Google's commissions (in \$) between the actual world and the but-for world. In other words, the pure

overcharge calculation predicts that in the but-for world developers would have passed on to consumers all the value of the reduction in commission in the form of lower app prices.<sup>1133</sup>

558. For an illustration, suppose that  $p_1$  is the price in the actual world,  $p_2$  is the price in the but-for world,  $\tau_1$  is the commission in the actual world, and  $\tau_2$  is the commission in the but-for world. Then the overcharge to consumers as a result of higher commission (in \$) would equal to  $\tau_2 p_2 - \tau_1 p_1$ . That is, in my model, the price in the but-for world would fall to the point where  $p_2 - p_1 = \tau_2 p_2 - \tau_1 p_1$  holds.<sup>1134</sup>

559. This result is independent from the app's marginal cost in my model, as long as the marginal cost is not zero. The reason why this is independent of marginal cost is that the optimal price set by an app is equal to markup times the app's marginal cost.<sup>1135</sup> Hence, the percentage change in optimal prices set by firms would be independent of the marginal cost as it scales the prices in the but-for and actual world by the same amount, in my model. As I demonstrate in Section IX.B below, in general, marginal cost is likely to be greater than zero.

## 2. *Welfare Effect through Increased Varieties (Apps)*

560. In addition to the direct effect on price, my model also considers a second effect through which Google's anticompetitive conduct harms consumers – the welfare lost in the form of less app variety. I first consider, as an illustration, a hypothetical scenario in which prices are sticky in the but-for world, (*i.e.*, prices remain at the same level as in the actual world ( $p_2 = p_1$ )). In this scenario, there are no overcharge damages, as, by assumption, prices do not change. Nonetheless, as

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<sup>1133</sup> I understand that other trial experts in this case may opine on the question of whether consumers may have felt less than 100% of the price effect due to market conditions. I have not been asked to opine on that question. However, the model can easily be adapted to show the price and variety effects on consumers given different assumptions about the market. To the extent that other experts in this case opine that consumers felt less than 100% of the price effect of Google's conduct, I reserve the right in rebuttal to testify about the effect of those different assumptions on my model's calculations.

<sup>1134</sup> See for example Anderson, Simon P., André de Palma, and Brent Kreider, "Tax Incidence in Differentiated Product Oligopoly," *Journal of Public Economics*, Vol. 81, 2001, pp. 173–192, at 172 ("[A]d valorem... taxes in an oligopolistic industry with differentiated products and price setting (Bertrand) firms... may be passed on to consumer by more than 100 percent...").

<sup>1135</sup> See Landes, William M. and Richard A. Posner, "Market Power in Antitrust Cases," *Harvard Law Review*, Vol. 94, No. 5, 1981, pp. 937-996 (hereafter "Landes and Posner (1981)"), at pp. 937-939.

I demonstrate below and describe in more detail in Appendix F, even in a world in which there is no direct effect on price, there is still harm to consumers in the form of lost app variety.

561. My model demonstrates that, but for Google's conduct, there would be a greater variety of apps on the market, which would increase consumers' utility. As I demonstrate below, the loss of this utility benefit due to Google's anticompetitive conduct can be quantified in dollar terms. Analyzing or quantifying the preferences for and benefits of variety to consumers is common in the economics literature.<sup>1136</sup>

562. While lower commissions decrease prices that consumers pay for downloads and in-app purchases, as explained above, I shut down this price effect by holding price constant in the model when quantifying the welfare effect through increased varieties; that is, I fix app and in-app prices at the actual levels and consider only the welfare effects of increased varieties (or the number of apps) due to the lower commissions and more Play Points in the competitive but-for world. Even if app prices did not change in the competitive but-for world, developers would still expect higher profits because lower commissions imply higher revenues per transaction and an earlier launch of Play Points implies increased demand from consumers (as explained below, earlier launch of Play Points translates into the higher direct discounts to consumers). These effects induce more entry because developers would, in the hypothetical world, expect higher profits that are more likely to cover developers' fixed costs or make developing a new app more profitable than their next best alternative option to developing an app, and hence, more apps would enter the market.<sup>1137</sup>

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<sup>1136</sup> Dixit, Avinash K. and Joseph E. Stiglitz, "Monopolistic Competition and Optimum Product Diversity," *The American Economic Review*, Vol. 67, No. 3, 1977, pp. 297-308 (hereafter "Dixit and Stiglitz (1977)"); Petrin, Amil, "Quantifying the Benefits of New Products: The Case of the Minivan," *Journal of Political Economy*, Vol. 110, No. 4, August 2002 (hereafter "Petrin (2002)"); Brynjolfsson, Erik, Yu (Jeffrey) Hu, and Michael D. Smith, "Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Booksellers," *Management Science*, Vol. 49, No. 11, 2003, pp. 1580-1596 (hereafter "Brynjolfsson et al (2003)"); Nair et al (2004), pp. 25, 35, 43-45,

<sup>1137</sup> Because I do not allow prices to fall either because of the direct effects of lower commissions and higher Play Points, or because of the increased competition between apps as more apps enter, the variety effect that I measure is larger than it would be if prices adjusted. The reason is that if prices also adjusted downward, fewer firms would enter given the lower prices. When I calculate the change in total consumer welfare, I account for changes in prices and variety together.

563. In my model, consumers intrinsically value varieties (more apps), and as a result, their welfare improves in the competitive but-for world even if app prices do not decrease. The model allows me to calculate the amount of money that one would need to give to consumers in the actual world (under the actual prices and varieties) to generate the utility level that they would experience in the competitive but-for world. For example, if the utility level in the but-for world would be 5 and in the actual world it is calculated to be 3, I can quantify the dollar value that provides consumers the utility levels of 3 and 5. This method for converting a welfare change to a dollar equivalent is referred to as equivalent variation in the economics literature.<sup>1138</sup> I explain how I derive the equivalent variation in Appendix F. The value in dollars of the foregone benefits of additional apps is another source of damages to consumers.

### 3. *Total Welfare Effect of Lower Commissions or Earlier Launch of Play Points*

564. In fact, in a world absent Google's challenged conduct, consumers would have benefited from both effects described above. Thus, the total welfare effect includes both welfare effects due to the price decrease and welfare effects due to the increased varieties. Consumers benefit directly from lower prices, which enable them to buy more products and more of each product. On the other hand, the lower commission and earlier introduction of Play Points would increase developers' profits and induce more entry and competition. As a result, consumers also benefit from more varieties. To calculate the total damages, I convert the total welfare change to dollar equivalent as explained in Section IX.A.2 above, the details of which are described in Appendix I.

565. One thing to note is that, unlike the welfare effect through increased varieties described in Section IX.A.2 above, the total welfare effect allows for prices to change as a result of lower commission and higher Play Points as well as increased competition between apps as more

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<sup>1138</sup> For a discussion about notions of equivalent and compensating variation, see Mas-Colell, Andreu, Michael D. Whinston, and Jerry R. Green, "*Microeconomic Theory*," Oxford University Press, June 1995 (hereafter "Mas-Colell et al (1995)"), pp. 80-91. See also Varian, Hal R., "*Intermediate Microeconomics: a Modern Approach*," Eighth Edition, New York, NY: W.W. Norton & Company, 2010 (hereafter "Varian (2010)"), pp. 258-262.

apps enter. Since the prices decrease, this puts downward pressure on developers' profits and induces less entry (and hence less variety) compared to the case where I assume that prices are sticky and calculate the welfare effect through increased variety (*see* Section IX.A.2). Thus, the overcharge damages from Section IX.A.1 and damages due to foregone varieties from Section IX.A.2 do not add up to what I refer to as the total welfare effect damages. However, the overcharge damages from Section IX.A.1 are included in the total welfare effect damages, and can be compared with them

## **B. Developer Marginal Costs**

566. As noted above, my model requires that marginal cost not be equal to zero. A developer's marginal costs could potentially include customer support costs, hosting costs, user acquisition costs, salaries and wages, and costs associated with creating new versions and upgrading in-app content, to the extent these costs scale up with the number of downloads and sales of in-app content. Based on my review of evidence in the record, I find these costs are unlikely to be zero. For example, the Pure Sweat Basketball 2019 P&L statement shows that advertising and marketing expenses plus salaries and wages accounted for about 31 percent of total revenues.<sup>1139</sup> As another example, Epic's document titled "Epic Games | 2019-2025 Annual Segment P&L (Overhaul & Non-GAAP)" shows a breakdown of costs in which hosting/production costs, customer support costs, user acquisition costs, and operating expenses are non-zero.<sup>1140</sup>

567. Those costs can be considered marginal costs because, to increase sales (or continue to generate sales in future periods) or support existing customers, an app would need to pay more for advertising and marketing and pay wages (that is, an app would need to keep buying labor hours to continue selling its app over time and providing customer support). In general, those labor hours

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<sup>1139</sup> Czeslawski (Pure Sweat Basketball) Deposition, p. 339 and Exhibit 268 (Pure Sweat Basketball 2019 P&L statement).

<sup>1140</sup> Vogel (Epic Games) Deposition, Exhibit 450. *See also* Epic's president, Adam Sussman's, testimony that Epic's EBITDA margin around 2020 was about 40 percent which is a "healthy margin (Sussman (Epic Games) Deposition, pp. 73-77)." *See also* GOOG-PLAY-001058642, at 682, 779 (Google assumes that if "**Epic contracts with OEMs** to gain home screen placement of store" then Epic would have to pay \$3.50 per device.).

may, for example, include costs related to certain ongoing maintenance-related tasks after app development.<sup>1141</sup>

568. Advertising and marketing costs on their own can scale with sales and can be nontrivial. For example, “getting a game into the hands of players... includes testing, marketing, making a trailer, localisation, advertising” and so on.<sup>1142</sup> “For a bigger project[], marketing budget can equal up to 50% of the development budget.”<sup>1143</sup>

569. Moreover, as noted below, developers use various methods to advertise their apps and many of those methods use cost per download/install/acquisition pricing strategies, and thus scale with sales:

- Cost-per-install (CPI) is a metric used to assess the cost a developer incurs for every additional install (customer) associated to some mobile app marketing campaign. Specifically, “publishers place digital ads across a range of media in an effort to drive installation of the advertised application. The brand is charged a fixed or bid rate only when the application is installed.”<sup>1144</sup> CPIs may be nontrivial; for example, in 2021, the average mobile app CPI was \$5.28 in North America.<sup>1145</sup>
- Customer Acquisition Cost (CAC) is a metric calculated by dividing total spend by the number of customers: “For example, if the same ad campaign cost \$5,000 and it acquired 1000 new users, the CAC is \$5,000/1000 or \$5 per new user.”<sup>1146</sup>

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<sup>1141</sup> Ghose and Han (2014), p. 1474 (“[O]ngoing marginal costs arise from various maintenance tasks after app development...”).

<sup>1142</sup> Auroch Digital, “How much does it cost to make a game?” August 24, 2021, available at <https://www.aurochdigital.com/blog/2021/8/19/how-much-does-it-cost-to-make-a-game>.

<sup>1143</sup> Rocket Brush Studio, “HOW MUCH DOES IT COST TO DEVELOP A GAME,” May 6, 2022, available at <https://rocketbrush.com/blog/how-much-does-it-cost-to-develop-a-game>.

<sup>1144</sup> Dogtiev, Artyom, “Cost Per Install (CPI) Rates (2021),” *Business of Apps*, April 26, 2022, available at <https://www.businessofapps.com/ads/cpi/research/cost-per-install/>

<sup>1145</sup> Dogtiev, Artyom, “Cost Per Install (CPI) Rates (2021),” *Business of Apps*, April 26, 2022, available at <https://www.businessofapps.com/ads/cpi/research/cost-per-install/>

<sup>1146</sup> App Radar, “Key Metrics to Monitor for Subscription Apps,” April 21, 2022, available at <https://appradar.com/de/blog/key-metrics-to-monitor-for-subscription-apps>.

- “CPA often stands for cost per action or cost per acquisition. This takes CPI one step further; not only does someone need to click on an ad, but they also need to take a designated action, like filling out a form or downloading an app, before an advertiser is charged. This pricing model is typically used by advertisers and marketers with ad campaign goals further down the proverbial funnel. Similarly, some campaigns - particularly for companies with an app-centric business model - work on a CPI (cost per install) basis.”<sup>1147</sup>

570. For some apps, marginal cost may include content licensing costs, particularly for apps that offer streaming services like Netflix, SoundCloud, Sirius, Pandora, Spotify, etc. Such apps may use licensed intellectual property based on a per consumer/transaction basis. For example, Netflix uses statistical models to “determine expected hours of viewing for each piece of content over its license period” and compares “cost per hour viewed against other ‘like’ content deals (i.e., exclusive versus non-exclusive, TV versus movies, etc.).”<sup>1148</sup> In this way, it evaluates the content costs as an expected per unit measure. Netflix also incurs costs in producing original content and has increased its investment in original series and movies based on their success, a measure of which is their ability to generate the acquisition of new members and user engagement. In answers to its “Top Investor Questions,” Netflix states: “Given the success we’ve had with our original series, we are increasing our investment in this area and we expect the % of our content spend on original series to increase over time,” and “[w]e evaluate the performance of our originals several ways. We measure the impact of our originals on our ability to acquire new members and engagement, which is correlated with retention of existing members. We also seek reasonable economics relative to other exclusive content on a cost per hour viewed. We also take into account critical acclaim and awards for our originals and the impact original series may have on enhancing our brand and attractiveness of our service which helps with member growth.”<sup>1149</sup> Thus, these costs

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<sup>1147</sup> Inmobi, “How Are In-App Advertising Rates Calculated?” January 22, 2019, available at <https://www.inmobi.com/blog/2019/01/22/how-are-in-app-advertising-rates-calculated>.

<sup>1148</sup> Matthew Ball, “Netflix Is a Product & Technology Company (Netflix Misunderstandings, Pt. 2),” May 12, 2018, available at <https://www.matthewball.vc/all/netflixproduct>.

<sup>1149</sup> Netflix, “Top Investor Questions,” available at <https://ir.netflix.net/ir-overview/top-investor-questions/default.aspx>.



may be considered marginal cost because incurring costs to produce content would be associated with making additional sales. Epic also incurs intellectual property licensing costs which accounted for about 9% of its publishing budget for Fortnite in 2019.<sup>1150</sup>

571. Hosting and cloud computing costs are also marginal costs because they scale up with the number of users or usage.<sup>1151</sup> Developers can rent computing resources (servers) instead of buying a fixed amount of servers that run continuously. This approach allows developers to pay only for the capacity they use.<sup>1152</sup> For example, Epic Games and Netflix purchase such services.<sup>1153</sup> Finally, customer support and some maintenance costs are also marginal costs as they can scale with the number of users.<sup>1154</sup> Thus, collectively the evidence above suggests that the average marginal cost is not zero.

572. In my model, I assume that all developers have the same marginal cost  $c$ . That assumption is natural if firms set prices before learning their marginal cost.<sup>1155</sup> In that case, the

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<sup>1150</sup> EPIC\_GOOGLE\_01581798-826, at 811.

<sup>1151</sup> Angerhofer, Tirza J. and Roger D. Blair, “Economic Reality at the Core of Apple,” *The Antitrust Bulletin*, Vol. 66, No. 2, 2021, pp. 308-321 (hereafter “Angerhofer and Blair (2021)”), at p. 315 (“Consider an app that interacts with the internet in any way, such as online games, rideshare apps, or banking apps. In these cases, server traffic and therefore costs associated with additional server space and maintenance, which the app developer must bear, scale with the number of users.”); See also, Francis, Paul, “Mobile App Maintenance Costs,” *The BHW Group*, January 16, 2017, available at <https://thebhwgroup.com/blog/mobile-app-maintenance-costs>; VentureBeat, “Zoom’s surging free user base dents margins as cloud costs rise,” December 1, 2020, available at <https://venturebeat.com/business/zooms-surging-free-user-base-dents-margins-as-cloud-costs-rise/>.

<sup>1152</sup> Amazon Web Services, “Amazon GameLift Pricing,” available at <https://aws.amazon.com/gamelift/pricing/>.

<sup>1153</sup> Amazon Web Services, “Epic Games Delivers Entertainment Experiences at Global Scale on AWS,” 2021, available at [https://aws.amazon.com/solutions/case-studies/epic-games/?did=cr\\_card&trk=cr\\_card](https://aws.amazon.com/solutions/case-studies/epic-games/?did=cr_card&trk=cr_card); and Amazon Web Services, “Netflix on AWS,” available at <https://aws.amazon.com/solutions/case-studies/netflix/>.

<sup>1154</sup> Angerhofer and Blair (2021), p. 315 (“[T]he cost of user support may be directly related to volume. Although the App Store takes care of much of the support for downloading the apps, the app developers need to interact with users who have questions about the app itself.”); Angerhofer and Blair (2021), footnote 33.

<sup>1155</sup> Developers are likely to have a degree of uncertainty about marginal costs. For example, Netflix estimates content costs as an expected per unit measure (see the discussion in this section). Also, CPI is likely to be uncertain to developers. For example, AppBrain uses a bidding procedure for selling ads. This bidding process determines CPI for a given sale. In this bidding process, a developer may end up paying less than its bid per install because developer “will only pay enough to beat the next best ad in the ad rank.” See AppBrain, “The AppBrain advertising system,” available at <https://www.appbrain.com/info/help/advertiser-resources/adssystem.html>. Uncertainty about marginal costs is also

interpretation of the marginal cost in my model is that it is an average marginal cost, which is an approximation to the reality in which developers have some uncertainty about various features of the market, including whether their app will be successful. A recent paper by Janßen et al., which uses data on apps in the Google Play Store to study the effect of the General Data Protection Regulation (“GDPR”) in the EU on entry of new apps and innovation, finds “strong evidence that app success is unpredictable.”<sup>1156</sup> Also, I show in Appendix F that the pricing equation that I derive closely approximates the average pricing equation that would arise in a model with heterogeneous marginal costs. While the costs discussed above may vary across different apps, the predicted price from my model approximates the average price that would arise, in that setting.

573. Finally, as long as the marginal cost is non-zero and an estimate of app’s own-price demand elasticity is given, the level of actual price determines the magnitude of marginal cost. This follows from the Lerner’s Index which states that price equals marginal cost multiplied by the markup over marginal cost. If markup is given, then the level (scale) of price determines marginal cost. For example, if markup is 1.5 and price is \$9, then the implied marginal cost would be  $\$9/1.5=\$6$ . Now, under the same markup, if instead price is \$18, the implied marginal cost would be  $\$18/1.5=\$12$ .<sup>1157</sup>

574. Moreover, if the marginal cost from the Lerner Index is more than what one would obtain using alternative methods for estimating marginal cost (*e.g.*, benchmarking or regression

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often assumed in economic literature. *See* for example Hansen, Gary D., “Indivisible labor and the business cycle,” *Journal of Monetary Economics*, Vol. 16, Issue 3, 1985, pp. 309-327 (hereafter “Hansen (1985)”); Ireland, Peter N., “A method for taking models to the data,” *Journal of Economic Dynamics and Control*, Vol. 28, Issue 6, 2004, pp. 1205-1226 (hereafter “Ireland (2004)”). Finally, some seminal work on firm entry assumes same marginal costs across firms. *See* for example Berry, Steven T., “Estimation of A Model of Entry in the Airline Industry,” *Econometrica*, Vol. 60, No. 4, 1992, pp. 889-917, at p. 894; Bresnahan, Timothy F. and Peter C. Reiss, “Entry and Competition in Concentrated Markets,” *Journal of Political Economy*, Vol. 99, No. 5, 1991, pp. 977-1009, at pp. 988-993.

<sup>1156</sup> Janßen, et al (2022) p. 22. For Dynamic Stochastic General Equilibrium models in macroeconomics that allow for aggregate technology shocks to the production process and hence uncertainties about the future marginal costs, *see* Hansen; (1985); Ireland (2004).

<sup>1157</sup> Using Lerner’s index to recover marginal cost or elasticity is a standard methodology in economics. There are various methodologies and ways of using the information contained in the index to recover marginal costs or elasticities, but generally these methodologies make use of a firm’s profit maximization condition (or price setting rule) to recover marginal cost or elasticity. *See, e.g.* Berry, S., J. Levinsohn, and A. Pakes, “Automobile prices in market equilibrium” *Econometrica*, Vol. 63, No. 4, July 1995, pp. 841–890 (hereafter “BLP (1995)”) pp. 853-854, 875-885; Brynjolfsson et al (2003), p. 1586.

approach), that would indicate that my elasticity estimate is too conservative (*i.e.*, too high, which implies that I underestimate damages). Indeed, I am using the elasticity estimate from Ghose and Han (2014), which is more conservative than the estimate I derive using Google's data, as described in Section IX.C. As I showed above, a low marginal cost is rationalized by a higher markup over marginal cost in my model: if the marginal cost is low, then firms must be enjoying high markups that rationalize the observed high prices in the data. Firms can set high markups if consumers are less willing to substitute to competing apps (*i.e.*, if apps' own-price elasticity of demand is low). Furthermore, if apps' own-price elasticity of demand is low, then consumers value varieties more as they view each variety as being more unique and difficult to substitute to other varieties. In this instance, the damages due to foregone varieties would be higher.

575. An assumption in my model of entry is that all apps have the same expected quality. As described above, that is consistent with recent evidence from Janßen et al. (2022). They use the General Data Protection Regulation in the European Union, which imposed restrictions on the way in which apps may handle personal data, as an exogenous increase in the cost of producing and operating an app. They show that the GDPR reduced the number of new apps. However, the share of new apps which were successful did not change after the GDPR, which the authors interpret as evidence that app success is unpredictable.<sup>1158</sup>

### **C. Estimating Apps' Own Price Elasticity of Demand**

576. My theoretical economic model generates a regression equation that is used to estimate apps' own price elasticity of demand, which is required to calculate the welfare effects through the increased varieties, total welfare effects, and associated damages. The regression estimates the effect of prices on the demand for apps and in-app content. A standard linear regression of log of quantity of items (apps or in-app content) purchased on the log of prices,<sup>1159</sup> in which I control for app, time, and app purchase type (*i.e.*, app download, subscription, or other type

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<sup>1158</sup> Janßen et al (2022), pp. 1, 22-24.

<sup>1159</sup> For a discussion of OLS method, *see* Wooldridge, Jeffrey M., *Introductory Econometrics: A Modern Approach*, Fifth Edition, Mason, OH: South-Western, Cengage Learning, 2009 (hereafter "Wooldridge (2009)"), Chapter 3.

of in-app content) fixed effects, may be problematic if prices are endogenous. That is, standard linear regression does not identify a causal relationship between prices and demand. I correct for such endogeneity by using an instrumental-variable (“IV”) regression, which is a standard approach in econometrics.<sup>1160</sup> I use app and in-app content sales tax rates as instruments for prices, based on a framework in the academic literature.<sup>1161</sup> As explained by Zoutman et al. (2018), tax rates can serve as a source of exogenous variation in prices for consumers: “a standard assumption in models of taxation ... is that the supply of a good depends on the before-tax price, whereas demand depends on the price after taxation.”<sup>1162</sup> A technical description of the regression and how it relates to my damages model is included in Appendix F.

577. To estimate apps’ own price elasticity of demand, I use the monthly app revenue data produced by Google, from which I calculate the quantity of transactions, prices, and tax rates on a monthly basis for each app package name and app purchase type combination in the data. I understand these data include paid- for purchases only; transactions relating to free purchases/downloads are not included in the data.<sup>1163</sup> In addition, I understand the data include U.S. consumers and worldwide developers.<sup>1164</sup> Relevant to my analyses, the data include the quantity of the product purchased by consumers, consumer expenditure on app and in-app content, sales taxes on those purchases, and the type of purchase (*i.e.*, paid download, subscription service, or other in-app content).

578. My regression results are presented in Exhibit 71 below.

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<sup>1160</sup> For a discussion of IV method, *see* Wooldridge (2009), Chapter 15.

<sup>1161</sup> *See, e.g.*, Zoutman, Floris T., Evelina Gavrilova, and Arnt O. Hopland, “Estimating Both Supply and Demand Elasticities Using Variation in a Single Tax Rate,” *Econometrica*, Vol. 86(2), 2018, pp. 763-771 (hereafter “Zoutman et al. (2018)”). *See also* Dearing, Adam, “Estimating structural demand and supply models using tax rates as Instruments,” *Journal of Public Economics*, Vol. 205, 2022 (hereafter “Dearing (2022)”).

<sup>1162</sup> Zoutman et al. (2018), p. 764.

<sup>1163</sup> Letter from Brian C. Rocca to Gregory Arenson, October 11, 2021.

<sup>1164</sup> *See* Letter from Brian C. Rocca to Melinda R. Coolidge, September 3, 2021, p. 2; Letter from Brian C. Rocca to Steve Berman, Hae Sung Nam, Yonatan Even, and Brendan Glackin, February 17, 2022, p. 1.

**Exhibit 71**  
**Demand Estimation Results: Baseline Model**

<b>Log-Log Demand Model</b>	<b>OLS</b>	<b>IV</b>
Elasticity		
App Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Purchase Type Fixed Effects	Yes	Yes
Weak Instrument	N/A	No
Number of Obs.	373,454	373,454

*Notes:*

1. \*\*\*, \*\*, and \* denote statistical significance at 1%, 5%, and 10% levels, respectively.
2. The data are limited to the following device types: “DEVICE\_FRONTEND\_PHONE,” “DEVICE\_FRONTEND\_TABLET,” and missing device type values.
3. The regression uses data for August 2016 to December 2021. The data are limited to the top apps by total consumer spending net of developer discounts between January 2012 and December 2021 that cover 95 percent of consumer spending net of developer discounts in the data.
4. Data are aggregated at year/month/app/purchase type level.
5. Price after tax is used in the regressions. Prices and tax rates are calculated using consumer spend net of developer discounts.
6. Data are demeaned to account for app fixed effects.
7. The IV model is implemented using 2SLS method and uses log of one plus sales tax rate as an instrument.
8. To determine whether the instrument is weak, I use Kleibergen-Paap rk Wald F-Statistic and Stock-Yogo critical values.

*Sources:* Google Monthly App Revenue Data.

579. As noted above, the linear specification indicates the need for an exogenous instrument that affects price independently of other demand drivers. Using log of tax rate plus one as an instrument, the IV specification provides a negative elasticity of -1.736.

580. In their paper, “Estimating Demand for Mobile Applications in the New Economy,” Ghose and Han (2014) estimate an expected own price elasticity on Google Play using a nested logit demand model and a sample of paid and free apps on Google Play.<sup>1165</sup> Their expected own price elasticity estimate of -3.731 is not dissimilar from my result.<sup>1166</sup> In order to estimate welfare

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<sup>1165</sup> Ghose, Anindya and Sang Pil Han, “Estimating Demand for Mobile Applications in the New Economy,” *Management Science*, Vol. 60, No. 6, 2014, pp. 1470-1488 (hereafter “Ghose and Han (2014)”).

<sup>1166</sup> Ghose and Han (2014), p. 1482.

effects of increased varieties and corresponding damages, since the elasticity estimate from Ghose and Han (2014) produces slightly more conservative results than the elasticity estimate from my model, I have chosen to use their estimate. Moreover, Ghose and Han (2014) also use the expected own price elasticity of -3.731, that they estimate, to compare effects of different pricing strategies on app demand for various apps.<sup>1167</sup>

581. Models with a constant elasticity of substitution are used often in the economics literature. For example, in the international trade literature, the constant elasticity of substitution assumption has been used when studying trade between countries for a wide variety of differentiated goods, including papers published in the most highly regarded economic journals.<sup>1168</sup> For example, Bernard et al (2003) study the impact of dollar appreciation and globalization on productivity, plant entry and exit, and employment in U.S. manufacturing. Under the constant elasticity of substitution assumption, they analyze U.S. plant-level data that includes over 200,000 plants.<sup>1169</sup> Additionally, Nair et al (2004) study indirect network effects in the market for Personal Digital Assistants (PDAs), and, in estimating demand for software available on PDAs, they assume that consumers of software have constant elasticity of substitution preferences.<sup>1170</sup>

582. I also run several sensitivities on my baseline regression model, (i) keeping various combinations of device types; and (ii) using various thresholds to determine the top apps by total consumer spending net of developer discounts between August 2016 and 2021. The results are presented in Exhibit 72 and Exhibit 73 below.

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<sup>1167</sup> Ghose and Han (2014), pp. 1482-1484.

<sup>1168</sup> See, e.g., Helpman, Elhanan, Marc Melitz, and Yona Rubinstein. "Estimating trade flows: trading partners and trading volumes," *Quarterly Journal of Economics*, Vol. 123, No. 2, 2008, pp. 441-487; Bernard, Andrew, B., Jonathan Eaton, J. Bradford Jensen, and Samuel Kortum, "Plants and Productivity in International Trade," *American Economic Review*, Vol. 93, No. 4, 2003, pp. 1268-1290;

<sup>1169</sup> Bernard et al (2003), pp. 1269, 1273-74, 1282, 1289.

<sup>1170</sup> Nair, Harikesh, Pradeep Chintagunta, and Jean-Pierre Dube, "Empirical Analysis of Indirect Network Effects in the Market for Personal Digital Assistants," *Quantitative Marketing and Economics*, 2, 2004, pp. 23-58 (hereafter "Nair et al (2004)"), at p. 23 and p. 35.

**Exhibit 72**  
**Demand Estimation Results: Device Type Sensitivities**

Log-Log Demand Model	OLS				IV			
	Baseline	Phone, Missing Only	No Tablet	All Devices	Baseline	Phone, Missing Only	No Tablet	All Devices
Elasticity								**
App FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Purchase Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weak Instrument	N/A	N/A	N/A	N/A	No	No	No	No
Number of Obs.	373,454	366,016	389,111	395,917	373,454	366,016	389,111	395,917

*Notes:*

1. \*\*\*, \*\*, and \* denote statistical significance at 1%, 5%, and 10% levels, respectively.
2. The data for the regressions including “All Devices” are limited to “DEVICE\_FRONTEND\_PHONE,” “DEVICE\_FRONTEND\_TABLET,” “PLAY\_RECURRENCE\_TASK\_SERVICE,” “GOOGLE\_TV,” “PAYMENTS\_BUY\_FLOW,” “BATTLESTAR\_FRONTEND,” and missing/unknown device types.
3. The data are limited to the top apps by total consumer spending net of developer discounts between 2012 and 2021 that cover 95 percent of consumer spending net of developer discounts in the data. Additionally, the regressions utilize data between August 2016 and 2021 only.
4. Data are aggregated at year/month/app/purchase type level.
5. Price after tax is used in the regressions. Prices and tax rates are calculated using consumer spend net of developer discounts.
6. Data are demeaned to account for app fixed effects.
7. The IV model is implemented using 2SLS method and uses log of one plus sales tax rate as an instrument.
8. To determine whether the instrument is weak, I use Kleibergen-Paap rk Wald F-Statistic and Stock-Yogo critical values.

*Sources:* Google Monthly App Revenue Data.

**Exhibit 73**  
**Demand Estimation Results: Threshold Sensitivities**

Log-Log Demand Model	Top 99%		Top 97%		Top 95%		Top 90%	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Elasticity								
App FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Purchase Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weak Instrument	N/A	No	N/A	No	N/A	No	N/A	Yes
Number of Obs.	1,209,185	1,209,185	574,787	574,787	373,454	373,454	181,852	181,852

*Notes:*

1. \*\*\*, \*\*, and \* denote statistical significance at 1%, 5%, and 10% levels, respectively.

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2. The data are limited to the top apps by total consumer spending net of developer discounts between 2012 and 2021 that cover 99, 97, 95, and 90 percent of consumer spending net of developer discounts in the data, respectively. Additionally, the regressions utilize data between August 2016 and 2021 only.
3. Data are aggregated at year/month/app/purchase type level.
4. Price after tax is used in the regressions. Prices and tax rates are calculated using consumer spend net of developer discounts.
5. Data are demeaned to account for app fixed effects.
6. The IV model is implemented using 2SLS method and uses log of one plus sales tax rate as an instrument.
7. To determine whether the instrument is weak, I use Kleibergen-Paap rk Wald F-Statistic and Stock-Yogo critical values.

*Sources:* Google Monthly App Revenue Data.

583. The IV sensitivities suggest that generally the elasticity is higher than [REDACTED]. One exception is the [REDACTED] sensitivity which generates an elasticity of about [REDACTED]. However, (i) the instrument is weak in that case and (ii) the estimate is statistically significant at the [REDACTED] level as opposed to all other IV results that are statistically significant at the [REDACTED] level.

#### **D. Methodology for Calculating Damages**

584. In this section, I explain a methodology for quantifying damages based on the direct price effects, the welfare effect through increased variety, and total welfare effects described in Section IX.A. In Section IX.E, I then demonstrate my model's calculations of damages for consumers in the Plaintiff States, by year, for the periods August 16, 2016, through May 31, 2022, and August 16, 2016, through June 5, 2023. I also calculate damages for consumers in all states.

585. For my damages calculations, I use Google transactions data to assess damages to consumers by state, for the Plaintiff States, and year. I first aggregate these data at the state/app purchase type/year level. I understand these data include paid for purchases only; transactions relating to free purchases/downloads are not included in the data.<sup>1171</sup> In addition, I understand these data include U.S. consumers and worldwide developers.<sup>1172</sup> Relevant to my analyses, the data

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<sup>1171</sup> Letter from Brian C. Rocca to Gregory Arenson, October 11, 2021, p. 2.

<sup>1172</sup> Letter from Brian C. Rocca to Melinda R. Coolidge, September 3, 2021, p. 2; Letter from Brian C. Rocca to Steve Berman, Hae Sung Nam, Yonatan Even, and Brendan Glackin, February 17, 2022, p. 1; Letter from Brian C. Rocca to Gregory Arenson, April 16, 2021, pp. 2-3; Letter from Brian C. Rocca to Gregory Arenson, May 5, 2021, p.2.

include quantity of the product purchased by the consumer as part of the transaction, consumer expenditure on app and in-app content, and the number of Play Points earned.

586. For each of the three damages effects (direct price effects, the welfare effect through increased varieties, and total welfare effects), I calculate three versions of damages corresponding to the hypothetical world in which Google does not have a monopoly in the Android App-Distribution Market, and hence there is competition in Android App Distribution, and also has not tied its Android app distribution services to the use of Google Play Billing:

- Pooled (Android App Distribution and Android In-App Billing Services) Markets with but-for commission and Play Points effects;
- Pooled (Android App Distribution and Android In-App Billing Services) Markets with but-for commission effects but no Play Points effects (*i.e.*, the but-for Play Points is set to equal actual Play Points); and
- Pooled (Android App Distribution and Android In-App Billing Services) Markets with but-for Play Points effects but no commission effects (*i.e.*, the but-for commission is set to equal actual commission);

587. Similarly, for each of the three damages effects (direct price effects, the welfare effect through increased varieties, and total welfare effects), I also calculate three versions of damages corresponding to the scenario in which Google has a legitimate monopoly in Android App Distribution but engages in anticompetitive tying:

- Android In-App Billing Services Market with but-for commission and Play Points effects;
- Android In-App Billing Services Market with but-for commission effects but no Play Points effects; and
- Android In-App Billing Services Market with but-for Play Points effects but no commission effects.

*1. Direct Effect of Lower Commissions and Greater Play Points on Prices*

588. The overcharge calculation is based on equation E.5 in Appendix F, which uses the following inputs for the quantification of damages:

- Consumer net expenditure, which is gross consumer expenditure net of Google and developer discounts;
- Google’s actual commission, which is Google’s commission (in \$) as a share of the gross consumer expenditure net of developer discounts;
- Google’s actual price discount to consumers, which is Google discounts, including Play Points, as a share of the gross consumer expenditure net of developer discounts;
- Google’s but-for commission, which is 15 percent in both markets as explained in Sections VII and VIII; and
- Google’s but-for price discount to consumers.

589. For the latter, I assume that, in a world in which Google faced competition in Android App Distribution, Google would have introduced its Play Points discounts to consumers earlier. As discussed in Section VII.B.4, several app stores have pursued direct discount/loyalty programs to retain or attract consumers, and Google introduced Play Points in Japan and Korea in response to competition from Amazon and OneStore. Google launched Play Points in South Korea approximately one year following the regulatory change in South Korea and ONE store’s subsequent reduction of its commission to 20% (or 5% if developers choose their own billing service provider).<sup>1173</sup> While Google’s discount/loyalty program for consumers may likely would have offered even more generous rewards in a world with greater competition, to be conservative I have assumed that the price discount due to Play Points in the but-for world would be comparable to

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<sup>1173</sup>See Mu-Hyun, Cho, “Google Play introduces reward points in South Korea,” ZDNet, April 22, 2019, available at <https://www.zdnet.com/article/google-play-introduces-reward-points-in-south-korea/>; Na, Hyun-joon and Minu, Kim, “Korean app market One Store vows to go global in 2022 with more popular games,” Pulse, August 24, 2021, available at <https://pulsenews.co.kr/view.php?year=2021&no=816068>; <https://pulsenews.co.kr/view.php?year=2021&no=816068>; GOOG-PLAY-000286779.R-847.R, at 842.R; GOOG-PLAY-000953420.R-460.R, at 422.R.

the same as the price discount in the actual world but that these discounts due to Play Points would have started earlier, approximately one year after the launch of the Google Play Store. I therefore extend Google's actual Play Points from the period 2020- May 2022 to previous years. More specifically, I (i) calculate the but-for price discount due to Play Points over 2020-May 2022 by dividing the dollar value of total Play Points (assuming 100 Play Points equals \$1) by the gross consumer expenditure net of developer discounts; (ii) multiply this by the gross consumer expenditure net of developer discounts from August 16, 2016 through 2019; and (iii) add this amount to the actual Google discounts from August 16, 2016 through May 2022, and divide that by the gross consumer expenditure net of developer discounts from August 16, 2016 through May 2022.<sup>1174</sup>

590. Using equation E.5 in Appendix F, I calculate a common percentage overcharge across Plaintiff States and relevant years, which I multiply by the net consumer expenditure to obtain the damages. To allocate damages across relevant state/years, I use the corresponding net consumer spends. To account only for the share of smart mobile devices , in allocating damages across state/years, I multiply net consumer spend by the share of net consumer spend for smart mobile devices for each year using Google's monthly app revenue data.<sup>1175</sup>

591. Finally, to extrapolate damages up to June 5, 2023, I regress net consumer spend on a constant and time trend using data for the period 2018-May 2022 to estimate the parameters of the regression model which I then use to predict net consumer spend for the extrapolation period. Consequently, for the extrapolated period, I allocate net consumer spend proportionally by state according to the percent distribution of net spend over states for the years 2018 through 2019. To only account for the share of smart mobile devices in damages, for the extrapolated period, I calculate the compounded annual growth rate of the share of net consumer spend for phones, tablets

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<sup>1174</sup> I reserve my rights to update this analysis, if requested, to assume that Google would have launched the Play Points program at a later date.

<sup>1175</sup> Note that Google in its correspondence regarding the transactions data stated that "We understand "device\_class" may not be tracked accurately by Google and are investigating the burden of providing this information." (10/11/2021 Letter from Brian C. Rocca to Gregory Arenson, p.12). Thus, I use 'device\_type' field from Google Monthly App Revenue Data to account for the device type in the damages calculations.

and missing device types from 2019 to 2021. I then apply that rate to the 2021 share to predict 2022 and 2023 phone and tablet shares.

## 2. *Welfare Effect through Increased Varieties (Apps)*

592. In addition to the parameters explained in Section IX.D.1 above, I need the following two parameters to quantify damages due to the welfare effects through increased variety in the but-for world, under the assumption that prices do not respond directly or indirectly to commission or Play Points:

- Apps' own-price elasticity of demand which, as explained above, I take from Ghose and Han (2014);
- Developer fixed cost which is required to predict the number of apps in the but-for world. This is calibrated from the model equation that is based on the free entry condition of apps. Intuitively, fixed cost affects app developers' entry decisions because it serves as a threshold on variable profits such that, if variable profits are larger than fixed cost, the apps would keep entering.

593. Given the parameters, I solve the model to find the amount of dollars that one would need to give to consumers in the actual world (under the actual prices and varieties) to make them as well off as they would be in the competitive but-for world in which prices are fixed at the actual level. This is equivalent to calculating the percentage increase in welfare (also referred to as a multiplicative factor in equation E.9 of Appendix F) and multiplying by the net consumer spend. I calculate a common percentage increase in welfare across Plaintiff States and relevant years. I then multiply by the net consumer spend to quantify damages. To allocate damages across relevant state/years, extrapolate to the future period, and account for only phones and tablets, I follow the same procedure as explained in Section IX.D.1 above.

## 3. *Total Welfare Effect of Lower Commissions or Greater Play Points*

594. To quantify total damages, I need the same set of parameters as for the variety effects damages above. Again, I use those parameters to solve the model to find the amount of dollars that one would need to give to consumers in the actual world (under the actual prices and

varieties) to make them as well off as they would be in the competitive but-for world. In this total welfare calculation, unlike the variety effect calculation, I allow the prices to change in the but-for world as predicted by my model.

595. As above, for the variety effects damages, I calculate the percentage increase in welfare (also referred to as a multiplicative factor in equation E.10 of Appendix F) and multiply by the net consumer spend. I calculate a common percentage increase in welfare across Plaintiff States and relevant years. I then multiply by net consumer spend to quantify damages. To allocate damages across relevant state/years, extrapolate to the future period, and account for only phones and tablets, I follow the same procedure as explained in Section IX.D.1 above.

#### **E. Quantification of Damages to Consumers in the Plaintiff States**

596. Using the methodology to calculate damages described above, I quantify damages to consumers for the relevant damages period and Plaintiff States. Damages across Plaintiff States and the relevant time period for the Pooled Android App Distribution and Android In-App Billing Services Markets are summarized in Exhibit 74 and Exhibit 75 below. Damages by Plaintiff State and year are presented in Appendix I.

**Exhibit 74**  
**Damages for Android App Distribution and In-App Billing Services Pooled Markets (USD)**  
**for Consumers in the Plaintiff States, August 16, 2016 – May 31, 2022**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price			
Variety Effects			
Total Damages			

*Notes:*

1. These figures utilize data for all states (excluding missing states) from August 16, 2016 through May 31, 2022.
2. To only account for the share of phones and tablets in damages, in allocating damages across state/years, I multiply net consumer spend by the share of net consumer spend for phones, tablets, and missing device types for each year using Google Monthly App Revenue Data.

*Sources:*

1. Google Transaction Data.
2. Google Monthly App Revenue Data.
3. Census State Code Crosswalk.

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**Exhibit 75**  
**Damages for Android App Distribution and In-App Billing Services Pooled Markets (USD)**  
**for Consumers in the Plaintiff States, August 16, 2016 – June 5, 2023**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price	██████████	██████████	██████████
Variety Effects	██████████	██████████	██████████
Total Damages	██████████	██████████	██████████

*Notes:*

1. These figures utilize data for all states (excluding missing states) from August 16, 2016 through May 31, 2022.
2. To only account for the share of phones and tablets in the damages, in allocating damages across state/years, I multiply net consumer spend by the share of net consumer spend for phones, tablets and missing device types for each year using Google Monthly App Revenue Data. For years 2022 through 2023, I calculate the compounded annual growth rate of the share of net consumer spend for phones, tablets and missing device types from 2019 to 2021. I then apply that rate to the 2021 share to predict 2022 and 2023 phone and tablet shares.
3. I extrapolate net spend for June 1, 2022 through June 5, 2023 using a regression of net consumer spend on a time trend and a constant, using 2018-2022 data from Google Monthly App Revenue Data and Google Transaction Data. Consequently, I allocate net consumer spend proportionally by state according to the percent distribution of net spend over states for the years 2018 through 2022.

*Sources:* See sources for Exhibit 74.

597. The total direct effect (overcharge) damages for consumers in the Plaintiff States, for the commission only effect and the commission and Play Points effects versions, are approximately ██████ to ██████ for the period August 16, 2016 to May 31, 2022 and roughly ██████ to ██████ for the period August 16, 2016 to June 5, 2023. The direct effect damages for Play Points effect only versions are approximately ██████ for the period August 16, 2016 to May 31, 2022 and roughly ██████ for the period August 16, 2016 to June 5, 2023. The difference is driven by the fact that the but-for commission is about █ percentage points lower than the actual commission, whereas the but-for Google discount to consumers is about █ percentage points lower than the actual Google discount to consumers, based on the highly conservative assumption described above.

598. The variety effect damages for consumers in the Plaintiff States, for the commission only effect and the commission and Play Points effects versions, are approximately ██████ to ██████ for the period August 16, 2016 to May 31, 2022 and ██████ to ██████ for the period August 16, 2016 to June 5, 2023. The variety effect damages for Play Points effect only versions are



approximately [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] for the period August 16, 2016 to June 5, 2023.

599. The total damages in the Pooled Markets, including both the direct effect and variety effect, for consumers in the Plaintiff States for commission only effect and commission and Play Points effects versions are approximately [REDACTED] to [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] to [REDACTED] for the period August 16, 2016 to June 5, 2023. Total damages for Play Points effect only versions are approximately [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] for the period August 16, 2016 to June 5, 2023.

600. As explained in Section IX.A.3, the sum of direct effect and varieties effects damages is greater than total damages because prices are fixed in the varieties effect damages calculations while the total damages relaxes that assumption. As explained above, fixing the prices at the actual levels (*i.e.*, assuming prices do not go down in the but-for world) further incentivizes apps to enter and leads to more varieties compared to the case when prices fall in the but-for world.

601. Damages across Plaintiff States and the relevant time period for the In-App Billing Services Market are summarized in Exhibit 76 and Exhibit 77 below. Damages by Plaintiff State and year are presented in Appendix I. Damages for In-App Billing Services Market are similar to the damages for the Pooled Markets because consumer spending in the Google transaction data is heavily weighted toward in-app purchases.

602. The total direct effect (overcharge) damages for consumers in the Plaintiff States, for the commission only effect and the commission and Play Points effects versions, are approximately [REDACTED] to [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] to [REDACTED] for the period August 16, 2016 to June 5, 2023. The direct effect damages for Play Points effect only versions are approximately [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] for the period August 16, 2016 to June 5, 2023.

603. The variety effect damages for consumers in the Plaintiff States, for the commission only effect and the commission and Play Points effects versions, are approximately [REDACTED] to [REDACTED] for the period August 16, 2016 to May 31, 2022 and [REDACTED] to [REDACTED] for the period August 16, 2016 to June 5, 2023. The variety effect damages for Play Points effect only versions

are approximately [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] for the period August 16, 2016 to June 5, 2023.

604. The total damages , including both the direct effect and variety effect, for consumers in the Plaintiff States for commission only effect and commission and Play Points effects versions are approximately [REDACTED] to [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] to [REDACTED] for the period August 16, 2016 to June 5, 2023. Total damages for Play Points effect only versions are approximately [REDACTED] for the period August 16, 2016 to May 31, 2022 and roughly [REDACTED] for the period August 16, 2016 to June 5, 2023.

**Exhibit 76**  
**Damages for the In-App Billing Services Market (USD)**

for Consumers in the Plaintiff States, August 16, 2016 – May 31, 2022

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price	[REDACTED]	[REDACTED]	[REDACTED]
Variety Effects	[REDACTED]	[REDACTED]	[REDACTED]
Total Damages	[REDACTED]	[REDACTED]	[REDACTED]

*Notes:* See notes for Exhibit 74.

*Sources:* See sources for Exhibit 74.

**Exhibit 77**  
**Damages for the In-App Billing Services Market (USD)**  
**for Consumers in the Plaintiff States, August 16, 2016 – June 5, 2023**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price	[REDACTED]	[REDACTED]	[REDACTED]
Variety Effects	[REDACTED]	[REDACTED]	[REDACTED]
Total Damages	[REDACTED]	[REDACTED]	[REDACTED]

*Notes:* See notes for Exhibit 75.

*Sources:* See sources for Exhibit 74.

605. In my model, I can solve for how developers set price in response to Google's commission or I can set the price for developers and solve for the other elements of the model, such

as the number of entrants and consumer harm. That is evidenced by the direct effects and total effects entries in the table, where I solve for app prices, or the variety effects entries, where I hold app prices constant. I can use this feature of the model to consider alternative rates at which app prices respond to Google's commission.

606. For instance, suppose I were to consider the case in which, in response to Google decreasing commission from 30% to 15%, developers decrease price by 50% of the decrease in what developers pay Google (per transaction). I can equate the change in price to 50% of change in payment and recover the implied new price. I can then fix this new price and resolve the model in a manner similar to the variety effects version. For example, if the average price is \$9 when Google charges a 30% commission rate, then Google collects \$2.7 for each transaction. When I consider 15% commission rate, I can set  $(\text{new price} - \$9) = 0.5 * (0.15 * (\text{new price}) - \$2.7)$  and solve for the new price from this equation. This would give me the new price due to decrease in commission from 30% to 15% and under the assumption that developers decrease price by 50% of the decrease in what developers pay Google (per transaction). In this example, the new price would be about \$8.27. In order to consider a 50% response rate, I can hold app prices constant at \$8.27 and solve the remaining elements of the model in order to compute damages.

607. Counsel has not asked me to opine on the appropriate response rate to consider. Rather, we can see from the exhibits above that a response rate of 0% (the variety effects only calculation) generates damages lower than the total welfare version of damages which has approximately 100% response rate. Thus, to be extremely conservative, I adopt the variety effects entries as my proposed damages in this matter. However, I understand that other trial experts in this case may opine on the question of whether consumers may have felt less than 100% of the price effect due to market conditions. To the extent that other experts in this case opine that consumers felt less than 100% of the price effect of Google's conduct, I reserve the right in rebuttal to testify about the effect of those different assumptions on my model's calculations.

608. Counsel also asked me to quantify damages at the nationwide level during the damages period. Exhibit 78, Exhibit 79, Exhibit 80, and Exhibit 81 below provide the damages at the nationwide level.

**Exhibit 78****Damages for Android App Distribution and In-App Billing Services Pooled Markets (USD)  
for all U.S. Consumers, August 16, 2016 – May 31, 2022**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price			
Variety Effects			
Total Damages			

*Notes:* See notes for Exhibit 75.

*Sources:* See sources for Exhibit 74.

**Exhibit 79****Damages for Android App Distribution and In-App Billing Services Pooled Markets (USD)  
for all U.S. Consumers, August 16, 2016 – June 5, 2023**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price			
Variety Effects			
Total Damages			

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*Notes:* See notes for Exhibit 75.

*Sources:* See sources for Exhibit 74.

**Exhibit 80**  
**Damages for the In-App Billing Services Market (USD)**  
**for all U.S. Consumers, August 16, 2016 – May 31, 2022**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price			
Variety Effects			
Total Damages			

*Notes:* See notes for Exhibit 75.

*Sources:* See sources for Exhibit 74.

**Exhibit 81**  
**Damages for the In-App Billing Services Market (USD)**  
**for all U.S. Consumers, August 16, 2016 – June 5, 2023**

<b>Model</b>	<b>Commission and Playpoints Effects</b>	<b>Commission Effects Only</b>	<b>Playpoints Effects Only</b>
Direct Effects on Price			
Variety Effects			
Total Damages			

*Notes:* See notes for Exhibit 75.

*Sources:* See sources for Exhibit 74.

## **X. Conclusion**

609. Based on my review of the record and my analyses described above, I conclude that Google engaged in anticompetitive conduct that caused harm to competition and harmed Android smart mobile device users in the U.S. and worldwide (excluding China). My analysis demonstrates that Android App Distribution and Android In-App Billing Services are relevant antitrust markets for evaluating Google's challenged conduct. I find these markets are worldwide, excluding China. I demonstrate that Google has substantial market power in Android App Distribution and In-App Billing Services and that non-Android app stores do not constrain Google in these markets.

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Moreover, I also conclude that Google uses its market power in Android App Distribution to tie the use of Google Play Billing for digital content on apps distributed through Google Play.

610. To assess the harm to consumers caused by Google's anticompetitive and exclusionary conduct, I develop a model of monopolistic competition between apps, based on Church and Gandal (1993), in which developers supply apps and in-app content and compete on prices charged to consumers. I use the model to calculate separate damages for two effects that a lower commission and more Play Points would have had, but for Google's anticompetitive conduct, on consumers' welfare, including a direct effect ("overcharge"), a welfare effect through increased varieties/apps, as well as a combined total effect.

611. I provide several measures of damages that variously hold entry constant, hold prices constant, or allow for a total effect on consumer welfare in response to Google's high commissions and low discounts. While the total welfare effect accounts for all of the economic effects of the high commissions and low discounts, to be conservative I take the minimum of the total welfare damages and variety damages, where, in the latter, I hold the price constant, (*i.e.*, no changes in app pricing in response to commission changes). I therefore find damages in the Android App Distribution and In-App Billing Services Markets of roughly [REDACTED] for the period August 16, 2016, to June 5, 2023 ("the damages period"). I can also use the model to calculate damages associated with the tie of Android in-app billing services only, which I find to be approximately [REDACTED]



Marc Rysman, Ph.D.

October 3, 2022

**Appendix A**  
**Curriculum Vitae of Marc Rysman**

**MARC RYSMAN**

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Boston, MA 02215

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(617) 353-3086 (office)

**EDUCATION**

Ph.D. Economics, University of Wisconsin-Madison

B.A. Economics, Columbia University

**PRIMARY ACADEMIC APPOINTMENTS**

Professor, Boston University, 2011 to present

Associate Professor, Boston University, 2006 to 2011

Assistant Professor, Boston University, 1999 to 2006

**VISITING POSITIONS**

Visiting Scholar, Center for Consumer Payments Research, Federal Reserve Bank of Boston, 2009-2019

Visiting Scholar in Economics, Harvard University, 2014-2015

Visiting Associate Professor, Economics Department, Massachusetts Institute of Technology, 2007-2008

Visiting Scholar in Economics, Harvard University, 2003-2004

Visiting Fellow, Center for Studies in Industrial Organization, Northwestern University, May-June 2003

Visiting Scholar, Federal Reserve Bank of Minneapolis, July 2003

Research Assistant, Brookings Institution, 1992-1994

**EDITORIAL POSITIONS**

Editor, RAND Journal of Economics, 2014-2020

Editor, Review of Network Economics, 2010-2015

Associate Editor, Journal of Industrial Economics, 2010-2014

Associate Editor, The RAND Journal of Economics, 2007-2014

Associate Editor, International Journal of Industrial Organization, 2005-2014

Co-editor, Journal of Economics and Management Strategy, 2007-2010

**OTHER PROFESSIONAL SERVICE**

Advisory Committee on Interoperable Payment Systems Project for Innovations for Poverty Action, 2022

Program Committee for Asia-Pacific Industrial Organization Conference, December 2021



Scientific Committee for Online Seminar on the Economics of Platforms, Toulouse School of Economics, 2020 to present

Faculty affiliate to the Rafik B. Hariri Institute for Computing and Computational Science & Engineering, Boston University

Faculty affiliate to the Center for Innovation in Social Sciences, Boston University

Sponsorships, Industrial Organization Society, 2022

Secretary, Industrial Organization Society, 2018 to present

President, Industrial Organization Society, 2016-2017

Vice-President, President-Elect of Industrial Organization Society, 2014-2015

Academic Panel Member, Competition and Markets Authority, United Kingdom, 2016-2020

Organizing Committee, International Industrial Organization Conference 2008-2014

Organizer, Standards, Innovation and Patents Conference in Tucson. Sponsored by the NBER and USPTO. February 2012. Editor for special issue in IJIO

Organizing Committee, European Association for Research in Industrial Economics (EARIE) conference, Stockholm, 2011

Local Organizer, Summer Meetings of the North American Econometric Society, Boston University, 2009

#### **UNIVERSITY SERVICE**

Chair of the Department of Economics, 2020- present

Associate Chair of the Department of Economics, 2017-2020

Department Liaison to the Scientific Computing and Visualization Center, 2012- 2016

Merit and Equity Advisory Committee, 2001, 2002, 2009, 2014, 2016, 2019

Advisor to Second-year Graduate Students, 2013-2014, 2008-2009

Director, Junior Recruiting Committee, 2006-2007, 2009-2010, 2013-2014

Department newsletter, 2013

Chair, Academic Promotion and Tenure, College of Arts and Sciences, 2012-2013

Academic Promotion and Tenure, College of Arts and Sciences, 2011-2012

Discussion Facilitator in the Program in Responsible Conduct of Research for Graduate Students and Postdoctoral Researchers on March 31, 2011

College Teaching Prize Committee, Spring, 2011

Committee on Conflicts of Interest, 2008-2011

Co-director, Junior Recruiting Committee 2000-2001

Social Science Curriculum Committee, 2005-2007

Representative to CAS Reg-Prep (Registration Preparation)

Acting Director, Industry Studies Program, 2001-2002, 2009-2010

Summer Orientation Academic Advising, 2001, 2002, 2004, 2005

Junior Recruiting Committee 1999-2005

Undergraduate Studies Committee 1999-2005

**INVITED LECTURES (SELECTED)**

“Empirics of Network Effects,” Plenary Talk, Conference on “Digital Platforms: Opportunities and Challenges,” Toulouse School of Economics, October, 2020.

Panel on “The Current Economic Understanding of Multi-Sided Platforms,” Competition and Consumer Protection Hearings, organized by the Federal Trade Commission at George Mason Law School, October, 2018.

“Antitrust in Digital Industries,” Public Lecture organized by the Japanese Federal Trade Commission, Tokyo, March, 2014.

“Estimating Price-Cost Margins in a Dynamic Environment,” Invited Lecture, European Association for Research in Industrial Economics (EARIE), Munich, September 2015.

“Payment Networks,” Academic Consultants Conference for the members of the Board of Governors, Federal Reserve Bank, October 2011.

“Estimating Network Effects in a Dynamic Environment,” Invited Lecture, European Association for Research in Industrial Economics (EARIE), Stockholm, September 2011.

“Adoption and Use of Payment Instruments by US Consumers,” Keynote speech at conference entitled Payments Markets: Theory, Evidence and Policy, Granada, Spain. June, 2010.

“Platform Pricing at Sportscard Conventions,” Plenary speech at conference entitled Platform Markets: Regulation and Competition Policy. Mannheim, Germany, May, 2010.

“Empirical Analysis of Payment Card Usage,” Plenary session at Conference on Two-Sided Markets, Institut D’Economie Industrielle, Toulouse, January 2004.

**INVITED SHORT COURSES**

“Two-Sided Markets: From Theory to Empirics and Applications,” Shanghai University of Finance and Economics, June 2017.

“Static and Dynamic Demand Estimation,” for joint PhD program among Berlin universities, August 2014.

“Network Effects, Two-Sided Markets and Standard Setting,” Fordham Competition Law Institute Training for Agency Economists. (I taught one section of a week-long training for competition authority economists from many countries.) June, 2007-June, 2013.

“Structural Econometrics in Industrial Organization,” Hitotsubashi University, February 2009.

**PUBLICATIONS**

- Leong, K., Li, H., Rysman, M., and Walsh, C. (2022). Law enforcement and bargaining over illicit drug prices: Structural evidence from a gang's ledger. *Journal of the European Economic Association*, 20:1198–1230.
- Rysman, M. and Schwabe, R. (2021). Platform competition and the regulation of stock exchange fees. *Concurrences Competition Law Review*, (4):27–33.
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## WORKING PROJECTS

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- Ho, C.-Y., Rysman, M., and Wang, Y. (2021). Demand for performance goods: Import quotas in the Chinese movie market. Unpublished manuscript, Boston University.
- Chen, M., Rysman, M., Wang, S., and Wozniak, K. P. (2020). Payment instrument choice with scanner data: An MM algorithm for fixed effects in non-linear models. Unpublished manuscript, Boston University.
- Gowrisankaran, G. and Rysman, M. (2020). A framework for modeling industry evolution in dynamic demand models. Unpublished Manuscript, Boston University.
- Rapson, D. S., Rysman, M., and Wang, S. (2020). The impact of the Zero Emissions Vehicles mandate on the California automobile market.
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- McCalman, P. and Rysman, M. (2019). Airline services agreements: A structural model of network formation. Unpublished Manuscript, Boston University.
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## **GRANT ACTIVITY**

“Estimation and Computation of Dynamic Oligopoly and Network Effects Models”, with Gautam Gowrisankaran. National Science Foundation, SES-0922629, 2009-2013.

“Dynamic Demand for New Durable Goods: An Empirical Model and Applications to Pricing and Welfare,” with Gautam Gowrisankaran. National Science Foundation, SES-0551348, 2006-2009.

“Discrete adjustment costs, investment dynamics, and productivity growth: Evidence from Chilean manufacturing plants”, with Simon Gilchrist. National Science Foundation, SES-0351454, 2004-2006.

“Empirical Studies of Network Effects”, National Science Foundation, SES-0112527, 2001-2002.

## **COURSES TAUGHT**

EC333 Market Organization and Public Policy (Antitrust and Regulation): Fall 1999, Fall 2000, Spring 2002-2003, Spring 2005-2011, Fall 2008-2011, Spring 2016, Spring 2020, Fall 2020.

EC732 Topics In Industrial Organization (Graduate Empirical IO): Spring 2000-2001, Fall 2001, Spring 2003, Fall 2004, Spring 2005-2013, Spring 2016-2022.

EC711 Topics in Econometrics: Spring 2010-2011.

EC709 Advanced Econometrics II: Fall 2006, Fall 2015, Fall 2017-2018.

EC201/303 Intermediate Microeconomics: Fall 2001, Fall 2002, Fall 2005.

EC903 Graduate Student Seminar: Fall 1999, Fall 2000.

## **HONORS AND AWARDS**

Neu Family Award for Teaching Excellence in Economics, 2006, 2012.

Networks, Electronic Commerce and Telecommunications (NET) Institute Grant, 2009.

Professor of the Year, 2006-2007, awarded by Boston University Fraternities and Sororities

Networks, Electronic Commerce and Telecommunications (NET) Institute Grant, 2005.

Networks, Electronic Commerce and Telecommunications (NET) Institute Grant, 2003.

Gerald M. Gitner Award for Excellence in Undergraduate Teaching, 2000.

Christensen Award in Empirical Economics, 1997 (with Phil Haile).

## **MEMBERSHIPS**

American Economic Association

International Industrial Organization Society

## **TESTIMONY EXPERIENCE**

- *Independent Living Resource Center of San Francisco, et al. v. Lyft, Inc.* (US District Court, Northern District of California, Case No. C-19-01438). Deposition in August 2020 and trial testimony in June 2021.
- *Twentieth Century Fox Film v. Wark Entertainment*, JAMS Ref. No. 1220052735. Deposition in June 2018 and trial testimony in August 2018.

## **OTHER LITIGATION AND REGULATORY EXPERIENCE**

- Retained as a testifying expert by performing rights organization in the determination of the allocation of retransmission fees by the Copyright Royalty Board, 2022.
- Retained as a testifying expert by music publishers for antitrust counterclaims in a copyright infringement case, January 2020.
- Retained as a testifying expert by banks in a foreign antitrust case involving payment cards, 2018-2019.
- Retained as a testifying expert in a confidential FRAND Arbitration, Hong Kong International Arbitration Centre, 2019.
- Retained as an expert in a group of antitrust cases in the high-tech sector involving FRAND and unilateral conduct issues, 2018.
- Wrote “Stock Exchanges as Platforms for Data and Trading,” for the New York Stock Exchange, which NYSE submitted to the SEC as part of a regulatory filing, December 2019. A follow-up report was filed in July 2020.
- Advocacy presentation to the Antitrust Division of the Department of Justice on a matter involving standard setting in a technology industry, March 2020.
- Wrote a white paper for the Federal Communication Commission studying market power in the business data services market, which influenced rulemaking: “Empirics of business data services.” Appendix B of Business Data Services Federal Notice of Proposed Rulemaking, FCC 1654, 2016.
- Commissioned to write and present a paper on interchange fee policy and its effect on competition in the payments card market to the members of the Board of Governors of the Federal Reserve Bank. The paper was entitled “Payment Networks,” and the event was formally titled as the “Academic Consultant’s Conference for the members of the Board of Governors.” September 2012. I presented directly to Chairman Bernanke, Vice Chairman Yellen and the rest of the Board of the Governors

## **OTHER CONSULTING EXPERIENCE**

- Academic Panel Member, Competition and Markets Authority, United Kingdom, 2016 to 2020. I was called on periodically to provide advice on CMA cases.
- Served as an academic consultant to the Consumer Payments Research Center at the Federal Reserve Bank of Boston 2009-2019.
- Served as a consultant to the Association of Directory Publishers in their advocacy to various state and municipal governments on the benefits of competition in the Yellow pages market, 2007.



**Appendix B  
Materials Relied Upon**

**I. Expert Reports**

- Expert Report of Dr. Stanley Presser, *Google Play Consumer Antitrust Litigation*, Case No. 3:20-cv-05761-JD, October 3, 2022.
- Expert Witness Report of James Mickens, *Google Play Consumer Antitrust Litigation*, Case No. 3:20-cv-05761-JD, October 3, 2022.

**II. Depositions and Associated Exhibits**

- Deposition of Adam Sussman, President at Epic Games, January 7, 2022.
- Deposition of Andrew Rubin, Founder of Android and formerly Google Vice President, May 17-18, 2022.
- Deposition of Christian Cramer, Finance Director for Play at Google, January 13-14, 2022.
- Deposition of Christopher Dury, CEO at GetJar, September 16, 2022.
- Deposition of Christopher Li, Director and Head of Product Growth at Google, May 24-25, 2022.
- Deposition of Daniel Vogel, Chief Operating Officer at Epic Games, May 23, 2022.
- Deposition of David Kleidermacher, Vice President, Engineering, at Google, February 3-4, 2022.
- Deposition of Donn Morrill, Director of Developer Relations for Entertainment Devices and Services at Amazon, August 11, 2022.
- Deposition of Edward Cunningham, Product Manager for Android at Google, July 21-22, 2022.
- Deposition of Eric Chu, Engineering Director at Meta Platforms and formerly Director of the Android Developer Ecosystem at Google, December 20, 2021 and January 14, 2022.
- Deposition of George Christopolous, Founder of SlideMe, September 9, 2022.

- Deposition of Haseeb Malik, Director of Mobile Publishing at Epic Games, March 4, 2022.
- Deposition of Hiroshi Lockheimer, Senior Vice President of Platforms & Ecosystems at Google, August 15-16, 2022.
- Deposition of James Kolotouros, Vice President, Android Platform Partnerships at Google, February 2-3, 2022.
- Deposition of Jamie Rosenberg, Vice President of Strategy and Operations, Platforms and Ecosystems Division, at Google, February 10, 2022.
- Deposition of Jonathan Gold, Finance Manager for Android at Google, June 23-24, 2022.
- Deposition of Kirsten Rasanen, formerly Business Development Director at Google, August 17, 2022.
- Deposition of Kobi Glick, Product Manager at Google, December 15-16, 2021.
- Deposition of Lacey Ellis, Developer Class Representative and Founder and CEO of LittleHoots LLC, March 22, 2022.
- Deposition of Lawrence Koh, General Manager and Head of FIFA Mobile at EA and formerly Director and Global Head of Games Business Development at Google, December 9, 2021.
- Deposition of Michael Marchak, Director of Play Partnerships, Strategy and Operations, at Google, January 12-13, 2022.
- Deposition of Mrinalini Loew, Product Lead for Google Play Commerce at Google, September 15, 2022.
- Deposition of Nick Sears, Android Co-founder at Google, July 1, 2022.
- Deposition of Patrick Brady, Vice President of Engineering for Android's Automotive Efforts at Google, April 21, 2022.
- Deposition of Paul Feng, Product Management Director at Google, January 14 and 18, 2022.

- Deposition of Paul Perryman, Vice President of Partnerships for the Americas at Netflix, September 28, 2022.
- Deposition of Richard Czeslawski, Developer Class Representative and Chief Operating Officer and President of Pure Sweat Basketball, March 21, 2022.
- Deposition of Ruth Porat, Chief Financial Officer at Google, September 15, 2022.
- Deposition of Sameer Samat, Vice President of Product Management at Google, February 2-3, 2022.
- Deposition of Sandra Alzetta, Vice President and Global Head of Payments at Spotify, September 29, 2022.
- Deposition of Sebastian Porst, Security Engineer and Manager Two at Google, July 13-14, 2022.
- Deposition of Tian Lim, Vice President, Engineering Product UX, at Google, December 2, 2021.

### **III. Data, Associated Documentation, and Correspondence**

- AMZ-GP\_00001497
- GOOG-PLAY-000042623.R
- GOOG-PLAY-000416245; GOOG-PLAY-010801682
- GOOG-PLAY-002076224.R
- GOOG-PLAY-003332817.R
- GOOG-PLAY-010801685.R

- App Annie Data  
“AZ004 - Q1\_2\_4\_App\_downloads\_and\_user\_spend\_v0.2.csv”; “AZ004 - Q3a\_Proportion\_of\_Free\_Apps\_Google.csv”; “AZ004 - Q3b\_Proportion\_of\_Free\_Apps\_Apple.csv”; “AZ004 - Q8a\_Top\_100\_Developers\_WW\_exCN\_Google\_v0.2.csv”; “AZ004 - Q8b\_Top\_100\_Developers\_WW\_exCN\_Apple\_v0.2.csv”; “AZ004 - Q8c\_Top\_1000\_Developers\_Global\_Apple.csv”; “Notes, assumptions and caveats.xlsx”
- Census State Code Crosswalk  
“state\_crosswalk.txt”
- Google Monthly App Revenue Data  
GOOG-PLAY-005535886; GOOG-PLAY-010801688
- Google Transaction Data  
GOOG-PLAY-007203251; GOOG-PLAY3-000018260
- IDC, “IDC Quarterly Mobile Phone Tracker,” 2021Q4 Historical Release, February 11, 2022  
“IDC Mobile Phone Tracker\_FinalHistoricalPivot CMI\_2021Q4.xlsx”

#### **IV. Produced Documents**

- |                        |                         |
|------------------------|-------------------------|
| • AMZ-GP_00000001      | • EPIC_GOOGLE_01975130  |
| • AMZ-GP_00000259      | • GOOG-DOJ-19768791     |
| • ATT-GPLAY-00000692   | • GOOG-DOJ-27418506     |
| • ATT-GPLAY-00005216   | • GOOG-PLAY- 003330554  |
| • BUMBLE-00000001      | • GOOG-PLAY- 007317466  |
| • EPIC_GOOGLE_00006187 | • GOOG-PLAY-000000807   |
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**V. Other Case Documents**

- “Declaration of Peter Foster in Support of Plaintiffs Match Group LLC’s, Humor Rainbow INC.’s, Plentyoffish Media ULC’s, and People Media INC.’s Motion for Temporary Restraining Order,” *Match Group, LLC; Humor Rainbow, Inc; Plentyoffish Media ULC; and People Media, Inc. v. Google LLC; Google Ireland Limited; Google Commerce Limited; Google Asia Pacific PTE. Limited; and Google Payment Corp.*, United States District Court for the Northern District of California San Francisco Division, Case No. 3:22-cv-02746-JD, May 10, 2022.
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- “Defendants Google LLC, Google Ireland Limited, Google Commerce LTD., Google Asia Pacific PTE. LTD. and Google Payment Corp.’s Answers and Objections to Developer Plaintiffs’ First Set of Interrogatories to Defendants,” *Google Play Store Developer Antitrust Litigation*, the United States District Court for the Northern District of California San Francisco Division, Case No. 3:20-cv-05792-JD, July 6, 2021.

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- “Stipulation and [Proposed] Order on Match’s Motion for Temporary Restraining Order,” *Match Group, LLC, et al. v. Google LLC, et al.*, the United States District Court for the Northern District of California San Francisco Division, Case No. 3:22-cv-02746-JD, May 19, 2022.
- Letter from Benjamin Bradshaw, Counsel for Defendants, to John Byars, Counsel for Consumer Plaintiffs, April 29, 2022.
- Letter from Brian C. Rocca, Counsel for Defendants, to Yonatan Even, September 23, 2022.
- Letter from Brian C. Rocca, Counsel for Defendants, to Melinda R. Coolidge, Counsel for Plaintiffs, September 3, 2021.
- Letter from Brian C. Rocca, Counsel for Defendants, to Brendan Benedict, Utah Office of the Attorney General, August 23, 2022.

- Letter from Brian C. Rocca, Counsel for Defendants, to Gregory Arenson, Counsel for Plaintiffs, April 16, 2021.
- Letter from Brian C. Rocca, Counsel for Defendants, to Gregory Arenson, Counsel for Plaintiffs, May 5, 2021.
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#### **VI. Articles, Books, and Public Documents**

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- <https://www.whistleout.com/CellPhones/Guides/mobile-data>
- <https://www.wired.co.uk/article/google-acquisitions-data-visualisation-infoporn-waze-youtube-android>
- <https://www.wired.com/2008/06/ff-android/>
- <https://www.wired.com/2012/10/windows8-laplet-hybrid/>
- <https://www.wired.com/gallery/best-ereaders/>
- <https://www.wired.com/story/install-apps-outside-app-store-sideload/>
- <https://www.wirefly.com/news/samsung-offering-30-discount-purchases-made-galaxy-store>
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- <https://www.zdnet.com/home-and-office/networking/pocketgear-buys-handango-to-create-giant-app-store/>
- <https://www.zuora.com/products/billing-software/>
- <https://xsolla.com/products/paystation>
- <https://xsolla.com/solutions>

#### **VIII. Legal Documents**

- “Appeal from the United States District Court for the District of Delaware,” *United States v. E.I. du Pont de Nemours & Co.*, Case No. 353 U.S. 586, June 3, 1957.
- “Court’s Findings of Fact,” *United States v. Microsoft Corporation*, United States District Court for the District of Columbia, Case No. 98-1232.
- “Summary of Commission Decision of 18 July 2018 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement (Case AT.40099 – Google Android),” *Official Journal of the European Union*, November 28, 2019.
- Court of Justice of the European Union, “Judgment of the General Court in Case T-604/18 | Google and Alphabet v Commission (Google Android),” September 14, 2022.
- European Commission Directorate-General of Competition, “Commission Decision,” *Google Android*, Case No. AT.40099, July 18, 2018.
- U.S. Department of Justice and the Federal Trade Commission, “Horizontal Merger Guidelines,” April 8, 1997, available at [https://www.justice.gov/atr/horizontal-merger-guidelines-0#N\\_6\\_0](https://www.justice.gov/atr/horizontal-merger-guidelines-0#N_6_0).
- U.S. Department of Justice and the Federal Trade Commission, “Horizontal Merger Guidelines,” August 19, 2010, available at <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010>.

**Appendix C**  
**App Annie Top 100 Android App Developers, by Revenue, 2020**

<b>Developer</b>	<b>Revenue (2020)</b>	<b>Rank</b>
Playrix	\$854,449,063	1
NCSoft	\$768,303,873	2
King	\$580,071,480	3
Supercell	\$528,449,679	4
BANDAI NAMCO Entertainment Inc.	\$469,803,341	5
LilithGames	\$453,514,934	6
XFLAG, Inc.	\$441,985,566	7
Moon Active	\$441,751,698	8
Aniplex Inc.	\$430,812,951	9
SQUARE ENIX Co.,Ltd.	\$423,363,961	10
Netmarble	\$408,292,884	11
Niantic, Inc.	\$351,609,911	12
Google LLC	\$350,886,614	13
Scopely	\$303,789,222	14
Century Games Limited	\$296,674,219	15
NEXON Company	\$272,948,015	16
Roblox Corporation	\$266,761,037	17
PROXIMA BETA	\$266,149,795	18
IGG.COM	\$247,639,272	19
LINE Corporation	\$235,957,870	20
Zynga	\$230,779,009	21
GARENA INTERNATIONAL I PRIVATE LIMITED	\$229,623,662	22
Playtika	\$222,653,461	23
KingsGroup Holdings	\$215,361,579	24
Small Giant Games	\$213,432,531	25
Long Tech Network Limited	\$206,082,340	26
KONAMI	\$197,562,535	27
ELECTRONIC ARTS	\$191,326,441	28
Disney	\$184,891,865	29
Peak	\$177,545,447	30
SpinX Games Limited	\$161,721,964	31
Com2uS	\$161,052,928	32
Plarium Global Ltd	\$159,822,443	33
Tinder	\$151,924,514	34
Bigo Technology Pte. Ltd.	\$149,363,176	35
miHoYo Limited	\$148,521,614	36
SciPlay	\$145,630,968	37
Product Madness	\$139,562,592	38
Jam City, Inc.	\$137,429,778	39
Activision Publishing, Inc.	\$137,265,062	40

Gram Games Limited	\$135,199,718	41
YottaGame	\$132,481,770	42
GungHo Online Entertainment, Inc.	\$129,647,701	43
Huuuge Games - Play Together	\$126,311,946	44
NEXTERS GLOBAL LTD	\$126,232,716	45
VIZOR APPS LTD.	\$116,357,835	46
Camel Games Limited	\$115,205,746	47
Nintendo Co., Ltd.	\$114,779,921	48
Moonton	\$112,524,589	49
NetEase Games	\$111,267,642	50
Playtika Santa Monica	\$109,446,026	51
4399 KOREA	\$98,989,103	52
Big Fish Games	\$97,774,897	53
Kabam Games, Inc.	\$94,794,562	54
Warner Bros. International Enterprises	\$93,541,752	55
Twitch Interactive, Inc.	\$93,494,920	56
YOUZU(SINGAPORE)PTE.LTD.	\$91,295,562	57
Pandora	\$89,146,017	58
Kakao Games Corp.	\$89,120,452	59
Webzen Inc.	\$87,894,718	60
PLAYSTUDIOS INC	\$86,497,871	61
Smilegate Megaport	\$79,736,522	62
Magic Tavern, Inc.	\$79,644,309	63
Rovio Entertainment Corporation	\$78,802,305	64
KLab	\$77,437,939	65
SEGA CORPORATION	\$76,294,835	66
Crowdstar Inc	\$75,944,492	67
Facebook	\$74,631,717	68
Miniclip.com	\$74,588,819	69
Ten Square Games	\$74,024,584	70
GSN Games, Inc.	\$72,793,671	71
Yostar Limited.	\$70,763,662	72
My.com B.V.	\$69,845,520	73
Cygames, Inc.	\$68,509,849	74
PEARL ABYSS	\$66,527,949	75
Playdemic	\$65,815,453	76
Gamania Digital Entertainment Co Ltd	\$64,997,836	77
Yostar, Inc.	\$64,857,861	78
DeNA Co., Ltd.	\$63,864,380	79
Mechanist Internet Technologies Co., Ltd.	\$61,284,552	80

Gameloft SE	\$60,752,305	81
Seriously Digital Entertainment Ltd.	\$59,566,388	82
ONEMT	\$59,565,006	83
Tactile Games	\$59,045,924	84
CHUANG COOL ENTERTAINMENT	\$58,960,546	85
Elex Wireless	\$58,191,381	86
ZlongGames	\$57,791,652	87
Glu	\$57,075,380	88
Wooga	\$56,590,713	89
Tango	\$56,170,492	90
Jelly Button Games	\$55,478,992	91
C4 Connect Inc.	\$52,539,430	92
Hyperconnect inc	\$52,097,594	93
Supertreat - A Playtika Studio	\$51,756,312	94
Playtika UK “House of Fun Limited	\$51,459,782	95
Melsoft Games Ltd	\$51,350,611	96
Mojang	\$50,715,450	97
Fun Games For Free	\$49,272,291	98
Wargaming Group	\$48,645,974	99
COLOPL, Inc.	\$47,848,819	100

Source: App Annie Data.

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
ASUS	Nov. 1, 2009 – Dec. 31, 2011	GOOG-PLAY-001477713	Andy Rubin, at -726	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. (a) The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	3(d) Placement Requirements: Unless otherwise approved by Google in writing; (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone Top Search and Android Market Client must be on the Device phone top; and (3) other Google Applications will be placed no more than one menu below the phone top.	1.10 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider.	12	
	Jan. 1, 2012 – Dec. 31, 2013	GOOG-PLAY-000617360	Andy Rubin, at -370	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	3.4. Placement Requirements. Unless otherwise approved by Google in writing; (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all Web search access points on the Device.	1.11 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and	12	



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						12. Network Location Provider.		
	(ret. Jan. 1, 2014) March 1, 2014 – Feb. 29, 2016	GOOG-PLAY-000617555	Hiroshi Lockheimer, at -755	“ ”	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded “Google” that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client <u>icon</u> ; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including “assist”, “search”, “voice search”, and “Web search” intents; (e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the “Home” button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or “Home” button on Devices with soft navigation buttons; [continues with (f) (initial Device set-up); (g) (logo in boot sequence); (h) (Google WebView Component preload, default, and “sole provider for the webpage-rendering APIs”; (i) (no changes to Google accounts and services; “as discoverable” parity)]	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Newsstand, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader.	27	



**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	March 1, 2016 – May 31, 2016	GOOG-PLAY-000617928	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	June 1, 2016 – Jan. 31, 2017	GOOG-PLAY-000618018	Jamie Rosenberg	“ ”	“ ”	“ ”		
	Feb. 1, 2017 – June 30, 2017	GOOG-PLAY-000618257	Jamie Rosenberg	“ ”	“ ”	“ ”		
	June 30, 2017 (ret.), Oct. 1, 2017 – Sept. 30, 2019	GOOG-PLAY-000618885	Jamie Rosenberg	1.15 “Device” means each Android Compatible Device  2.1 <u>License to the Google Applications.</u> [ . . . ] Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . . to (a) distribute the Google Applications on Devices . . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible	Listed in Google Product Geo Availability Chart		4.5

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; [requirements continue]			
	Oct. 1, 2019 – Dec. 31, 2019	GOOG-PLAY-000620119	Jamie Rosenberg	“ ”	“ ”	“ ”		“ ”
	Oct. 1, 2019 (ret.) – Sept. 31, 2020 (et seq.) (2.1)	GOOG-PLAY-000620339	Jamie Rosenberg					
Coolpad /Yulong	June 1, 2014 – May 31, 2015	GOOG-PLAY-000617538	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will:	1.1(m) 1. Google Play Client (does not include products	27	

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	<p>(a) preload all Google Applications approved in the applicable Territories on each Device;</p> <p>(b) preload on the Default Home Screen of each Device:</p> <p>(i) the Google Search widget;</p> <p>(ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and</p> <p>(iii) the Google Play Client icon;</p> <p>(c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen;</p> <p>(d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents;</p> <p>(e) ensure each Device allows an End User to directly access Google Search by either:</p> <p>(i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons;</p> <p>[requirements continue]</p>	<p>downloaded from Google Play),</p> <ol style="list-style-type: none"> <li>2. Calendar Sync,</li> <li>3. Contacts Sync,</li> <li>4. Gmail,</li> <li>5. Google+ (including Google+ Photos),</li> <li>6. Google Play Books,</li> <li>7. Google Calendar,</li> <li>8. Google Maps,</li> <li>9. Google Play Music,</li> <li>10. Google Partner Setup,</li> <li>11. Google Search (including Google Now),</li> <li>12. Google Chrome,</li> <li>13. Google Services Framework,</li> <li>14. Google Street View,</li> <li>15. Google Talk,</li> <li>16. Google Play Movies,</li> <li>17. Google Play Newsstand,</li> <li>18. Google Play Games,</li> <li>19. Google Drive,</li> <li>20. Google Backup and Restore,</li> <li>21. Google Voice Search,</li> <li>22. Media Uploader,</li> <li>23. Network Location Provider,</li> <li>24. Set Up Wizard,</li> <li>25. YouTube,</li> <li>26. Google WebView Component, and</li> </ol>		



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						27. Widevine (requires separate agreement with Google).		
	September 23, 2015 – Oct. 31, 2015	GOOG-PLAY-000617900	Hiroshi Lockheimer	“ ”	“ ”	“ ”	“ ”	
	Oct. 29, 2015 – Jan. 31, 2016	GOOG-PLAY-000617919	Hiroshi Lockheimer	“ ”	“ ”	“ ”	“ ”	
	Feb. 1, 2016 – Dec. 31, 2016	GOOG-PLAY-000617964	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	June 1, 2015 – Aug. 31, 2015	GOOG-PLAY-000617814	Hiroshi Lockheimer	“ ”	“ ”	“ ”	“ ”	“ ”
	Aug. 1, 2017 – July 31, 2019	GOOG-PLAY-000618704	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).	Listed in Google Product Geo Availability Chart		4.5

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; [requirements continue]			
	Aug. 1, 2019 – Oct. 31, 2019	GOOG-PLAY-000620057	Jamie Rosenberg	“ ”	“ ”			“ ”
	Oct. 29, 2018 – Dec. 31, 2019 (EEA)	GOOG-PLAY-000619636	Hiroshi Lockheimer	EEA	EEA	EEA		
HMD	April 1, 2017 – May 31, 2017	GOOG-PLAY-000618261	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement, and subject to Company being in compliance with a valid and effective Anti-Fragmentation Agreement, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	5.3 Placement Requirements; Device Set-Up. . . . Company must: (a) preload all mandatory Google Applications approved in the applicable Territories (as set out in the Google Product Geo Availability Chart) on such Android Compatible Device; (b) preload on the Default Home Screen of such Android Compatible Device: (i) the Google Search widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to a collection of icons for certain Google Applications as specified in Exhibit A (using the icons and text Google provides or approves in writing) and in the order specified in Exhibit A. (c) ensure that all preloaded Google Applications are placed in the application tray on such Android Compatible Device;	Listed in Google Product Geo Availability Chart		

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(d) set Google Search as the default search provider for the assist intent; [requirements continue]			
	June 1, 2017 – July 31, 2017	GOOG-PLAY-000618521	Jamie Rosenberg	“ ”	“ ”	“ ”		
	Aug. 1, 2017 – July 31, 2019	GOOG-PLAY-000618863	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term...	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).  (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; [requirements continue]	Listed in Google Product Geo Availability Chart		4.5



**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Aug. 1, 2019 – Oct. 31, 2019	GOOG-PLAY-000620095	Jamie Rosenberg	“ ”	“ ”	“ ”		
HTC	March 1, 2009 – Dec. 31, 2010	GOOG-PLAY-010511166	Andy Rubin, at -172	2.7 Authorization to Distribute Google Applications on the Devices. The license to distribute Google Applications in Section 2.1 is contingent upon the Device passing the OHA Compliance Test. The parties will work together in good faith to make the Device pass the OHA Compliance Test requirements.	Ex A 3. Placement Requirements: Google search box on phone top, and other Google Application placement requirements to be defined by Google.	Ex. A, at -173 1. Set-up Wizard 2. Google Phone-top Search 3. Gmail 4. Google Calendar 5. Google Talk 6. YouTube 7. Google Maps for Mobile 8. Google Street View 9. Contact Sync 10. Android Market Client (not products downloaded from Android Market) 11. Google Voice Search (only upon availability) 12. Google Street View (only upon availability)	12	
	Jan. 1, 2011 – Dec. 31, 2012	GOOG-PLAY-000620966	Andy Rubin, at -976	2.2 License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (f) take any actions that may cause or result in the fragmentation of Android . . .  2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device	3.4. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the	1.11 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync,	12	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	default search provider for all Web search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.	10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, 12. and Network Location Provider.		
	Jan. 1, 2013 – Aug. 31, 2013, (ext. to March 1, 2014 in follow-on agmt.)	GOOG-PLAY-000617419	Hiroshi Lockheimer, at -430	<p>2.2 License Grant Restrictions. Company shall not . . . (f) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7 Authorization to Distribute Google Applications on the Devices &amp; Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.</p>	<p>3.3. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) the Google Search widget and the Google Play Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; (4) Google Search must be set as the default search provider for all Web search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.</p> <p>In addition, any exceptions to the requirements in this Section 3.3 granted before the Effective Date of this Agreement shall also be exceptions under this Agreement. Any additional exceptions from the requirements of this Section 3.3 for Devices scheduled for release after the Effective Date of this Agreement will be considered by Google on a case-by-case basis.</p>	<p>1.13</p> <ol style="list-style-type: none"> <li>1. Google Play Client (does not include products downloaded from Google Play),</li> <li>2. Calendar Sync,</li> <li>3. Contacts Sync,</li> <li>4. Gmail,</li> <li>5. Google+,</li> <li>6. Google Play Books,</li> <li>7. Google Calendar,</li> <li>8. Google Maps,</li> <li>9. Google Play Music,</li> <li>10. Google Partner Setup,</li> <li>11. Google Search (Including Google Now),</li> <li>12. Google Chrome,</li> <li>13. Google Services Framework,</li> <li>14. Google Street View,</li> <li>15. Google Talk,</li> <li>16. Google Play Movies,</li> <li>17. Google Play Magazines,</li> </ol>	24-25	

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						18. Google Voice Search, 19. Market Updater, 20. Media Uploader, 21. Network Location Provider, 22. Set Up Wizard, 23. YouTube, and 24. Widevine (requires separate agreement with Google).		
	March 1, 2014 – Feb. 29, 2016	GOOG-PLAY-000617577	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents;	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies,	27-29	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [requirements continue]	17. Google Play Newsstand, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	March 1, 2016 – May 31, 2016	GOOG-PLAY-000617924	Philipp Schindler	" "	" "	" "	" "	
	June 1, 2016 – Oct. 31, 2016	GOOG-PLAY-000617966	Hiroshi Lockheimer	" "	" "	" "	" "	
	Nov. 1, 2016 – Feb. 28, 2017	GOOG-PLAY-000618064	Jamie Rosenberg	" "	" "	" "	" "	
	March 1, 2017 – June 30, 2017	GOOG-PLAY-000618260	Hiroshi Lockheimer	" "	" "	" "	" "	
	July 1, 2017 – Sept. 30, 2017	GOOG-PLAY-000618986	Jamie Rosenberg	" "	" "	" "	" "	
	Oct. 1, 2017 – Oct. 31, 2017	GOOG-PLAY-000619081	Jamie Rosenberg	" "	" "	" "	" "	

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Nov. 1, 2017 – Oct. 31, 2019	GOOG-PLAY-009640439	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; [requirements continue]	Listed in Google Product Geo Availability Chart		
Huawei	June 1, 2009 – Dec. 31, 2010	GOOG-PLAY-001745969	Andy Rubin	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. (a) “Android Compliant Device(s)” means Device(s) that: (i) comply with the Android Compatibility Definition	Ex. A 3. Placement Requirements: Company shall use commercially reasonable efforts to pre-load all Google Applications on each Device. At a minimum, Company must pre-load the Google Phone-Top Search and Android Market Client	Ex. A 1. List of Google Applications: 1. Set-up Wizard 2. Google Phone-top Search 3. Gmail	12	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				document (which may be updated from time to time), which can be found at the Android compatibility website ( <a href="http://compatibility.android.com">http://compatibility.android.com</a> ); and (ii) successfully pass the Android Compatibility Test Suite (CTS).	applications on all Devices, unless otherwise approved by Google in writing. Google Phone Top Search and Android Market Client must be on the Device phone top, unless otherwise approved by Google in writing. Other Google Applications will be placed no more than one menu below the phone top.	4. Google Calendar 5. Google Talk 6. YouTube 7. Google Maps for Mobile 8. Google Street View 9. Contact Sync 10. Android Market Client (not products downloaded from Android Market) 11. Google Voice Search 12. Google Street View [duplicate] 13. Network Location Provider.		
	Jan. 1, 2011 – Dec. 31, 2012	GOOG-PLAY-000857382	Andy Rubin, at -392	2.2 License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (f) take any actions that may cause or result in the fragmentation of Android . . .  2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the	3.4. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all search access points on the Device.	1.11 1. Set-up Wizard, 2. Google Phone-top Search 3. Gmail 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider.	12	

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Compatibility Test Suite prior to Launch.				
	May 1, 2014 – April 30, 2016	GOOG-PLAY-007981395	Hiroshi Lockheimer	<p>2.3 License Restrictions. Company may not, and may not allow or encourage any third party to: . . . (e) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7 Authorization to Distribute Google Applications on the Devices &amp; Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.</p>	<p>3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will:</p> <p>(a) preload all Google Applications approved in the applicable Territories on each Device;</p> <p>(b) preload on the Default Home Screen of each Device:</p> <p>(i) the Google Search widget;</p> <p>(ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified In Exhibit A (using the icons and text Google provides or approves in writing); and</p> <p>(iii) the Google Play Client icon;</p> <p>(c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen;</p> <p>(d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents;</p> <p>(e) ensure each Device allows an End User to directly access Google Search by either:</p> <p>(i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons;</p> <p>[requirements continue]</p>	<p>1.1(m)</p> <ol style="list-style-type: none"> <li>Google Play Client (does not include products downloaded from Google Play),</li> <li>Calendar Sync,</li> <li>Contacts Sync,</li> <li>Gmail,</li> <li>Google+ (including Google+ Photos),</li> <li>Google Play Books,</li> <li>Google Calendar,</li> <li>Google Maps,</li> <li>Google Play Music,</li> <li>Google Partner Setup,</li> <li>Google Search (including Google Now),</li> <li>Google Chrome,</li> <li>Google Services Framework,</li> <li>Google Street View,</li> <li>Google Talk,</li> <li>Google Play Movies,</li> <li>Google Play Newsstand,</li> <li>Google Play Games,</li> <li>Google Drive,</li> <li>Google Backup and Restore,</li> <li>Google Voice Search,</li> <li>Media Uploader,</li> </ol>	27	



**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	March 17, 2016 – July 31, 2016	GOOG-PLAY-001745388	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	July 14, 2016 – Dec. 31, 2016	GOOG-PLAY-001745389	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	Dec. 19, 2016 – March 31, 2017	GOOG-PLAY-001745410	Jamie Rosenberg	“ ”	“ ”	“ ”		
	March 27, 2017 – June 30, 2017	GOOG-PLAY-001745411	Jamie Rosenberg	“ ”	“ ”	“ ”		
	through Aug 30, 2017 (executed Aug. 29)	GOOG-PLAY-001745412	Jamie Rosenberg	“ ”	“ ”	“ ”		
	Sept. 13, 2017 – Sept. 30, 2017	GOOG-PLAY-001745852	Jamie Rosenberg	“ ”	“ ”	“ ”		
	Oct. 1, 2017 – Sept. 30, 2019	GOOG-PLAY2-000456929	Hiroshi Lockheimer	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment. . . .	4.4 Placement Requirements; Device setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices (for clarity, Exempt Device Models are excluded from the below requirements unless such Devices	Listed in Google Product Geo Availability Chart		



**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					are upgraded to the "O" version of Android); (a) preload all required Google Applications approved in the applicable Territories (as set out in the Google Product Geo Availability Chart on such Android Compatible Device; distribute on the Default Home Screen (but excluding the lockscreen and notification tray); (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for certain Google Applications as specified in Exhibit B (using the icons and text Google provides or approves in writing) and in the order specified in Exhibit B. (b) on any Android Compatible Device, ensure that all preloaded Google Applications that are not specified in Exhibit B are placed in the Application Tray and no more than one level below the Default Home Screen. On Devices with no Application Tray such applications will be placed no more than one level below the Default Home Screen;			
	Aug. 19, 2019 – Nov. 30, 2019	GOOG-PLAY-001745923	Jamie Rosenberg	" "	" "	" "		
	Nov. 15, 2019 – May 31, 2020	GOOG-PLAY-001745514	Jamie Rosenberg					

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## Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	March 27, 2020 – Nov. 30, 2020	GOOG-PLAY-001745943	Jamie Rosenberg					
	Nov. 29, 2020 – Dec. 31, 2020	GOOG-PLAY-001745952	Jamie Rosenberg					
	Jan. 1, 2021 – Feb. 28, 2021	GOOG-PLAY-001745695	Jamie Rosenberg					
	March 1, 2021 – May 31, 2021	GOOG-PLAY-001745994	Jamie Rosenberg					
Kyocera	Oct. 1, 2009 – Sept. 30, 2011	GOOG-PLAY-000621075	Andy Rubin	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. (a) The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	3(d) Placement Requirements: Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone Top Search and Android Market Client must be on the Device phone top; and (3) other Google Applications will be placed no more than one menu below the phone top.	1.10 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider.	12	
	July 1, 2011 – June 30, 2013	GOOG-PLAY4-000285505	N/A (unable to locate Google-	2.2 License Grant Restrictions. Company shall not, and shall not allow any third party to: ... (f)	3.4. Placement Requirements. Unless otherwise approved by Google in writing:	1.12	12	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
			executed copy)	take any actions that may cause or result in the fragmentation of Android ...  2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	(1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all Web search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.	List of Google Applications (may be changed by Google from time to time): 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider.		
	July 1, 2013 – Feb. 29, 2016	GOOG-PLAY-000617505	Hiroshi Lockheimer	2.3 License Restrictions. Company may not, and may not allow or encourage any third party to: . . . (e) take any actions that may cause or result in the fragmentation of Android . . .  2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded “Google” that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music,	27	

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	(iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents; (e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [requirements continue]	10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Newsstand, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	March 1, 2016 – June 30, 2016	GOOG-PLAY-000617925	Hiroshi Lockheimer	" "	" "	" "		
	Aug. 1, 2016 – Dec. 31, 2016	GOOG-PLAY-000617995	Jamie Rosenberg	" "	" "			

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Jan. 30, 2017 – March 31, 2017	GOOG-PLAY-000618094	Jamie Rosenberg	“ ”	“ ”			
	April 19, 2017 – June 30, 2017	GOOG-PLAY-000618256	Jamie Rosenberg	“ ”	“ ”			
	July 1, 2017 – June 30, 2019	GOOG-PLAY-000618559	Hiroshi Lockheimer					
	July 1, 2019 – Sept. 30, 2019	GOOG-PLAY-000619897	Hiroshi Lockheimer					



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Through Dec. 31, 2020 (renewing)	GOOG-PLAY-000620120	Jamie Rosenberg					
Lava	Nov. 1, 2014 – Oct. 31, 2016	GOOG-PLAY-000617749	Hiroshi Lockheimer	<p>2.3 License Restrictions. Company may not, and may not allow or encourage any third party to: . . . (e) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7 Authorization to Distribute Google Applications on the Devices &amp; Compatibility. (a) The license to distribute Google Applications In Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.</p>	<p>3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will:</p> <p>(a) preload all Google Applications approved in the applicable Territories on each Device;</p> <p>(b) preload on the Default Home Screen of each Device:</p> <p>(i) the Google Search widget at the top of such screen;</p> <p>(ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and</p> <p>(iii) the Google Play Client icon;</p> <p>(c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen on each Device;</p> <p>(d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents; and</p> <p>(e) ensure each Device allows an End User to directly access Google Search by either:</p> <p>(i) long pressing the "Home" button on Devices with physical navigation buttons, or</p>	<p>1.1(m)</p> <ol style="list-style-type: none"> <li>Google Play Client (does not include products downloaded from Google Play),</li> <li>Calendar Sync,</li> <li>Contacts Sync,</li> <li>Gmail,</li> <li>Google+ (including Google+ Photos),</li> <li>Google Play Books,</li> <li>Google Calendar,</li> <li>Google Maps,</li> <li>Google Play Music,</li> <li>Google Partner Setup,</li> <li>Google Search (including Google Now),</li> <li>Google Chrome,</li> <li>Google Services Framework,</li> <li>Google Street View,</li> <li>Google Talk,</li> <li>Google Play Movies,</li> <li>Google Play Magazines,</li> <li>Google Play Games,</li> <li>Google Drive,</li> <li>Google Backup and Restore,</li> </ol>	27	

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [requirements continue]	21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	Nov. 1, 2016 – Jan. 31, 2017	GOOG-PLAY-000618072	Hiroshi Lockheimer	" "	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget at the top of such screen; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen on each Device; (d) ensure each Device allows an End User to directly access Google Search by either:	" "	" "	



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [requirements continue]			
	Feb. 1, 2017 – April 30, 2017	GOOG-PLAY-000618141	Jamie Rosenberg	" "	" "	" "	" "	
	July 1, 2017 – Sept. 30, 2017	GOOG-PLAY-000618749	Hiroshi Lockheimer	2.1 License to the Google. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	4.4 Placement Requirements; Device Setup. In return for Google granting a no cost license to Google Applications for distribution on Devices under this Agreement, unless Google otherwise approves in writing, Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).	Listed in Google Product Geo Availability Chart		

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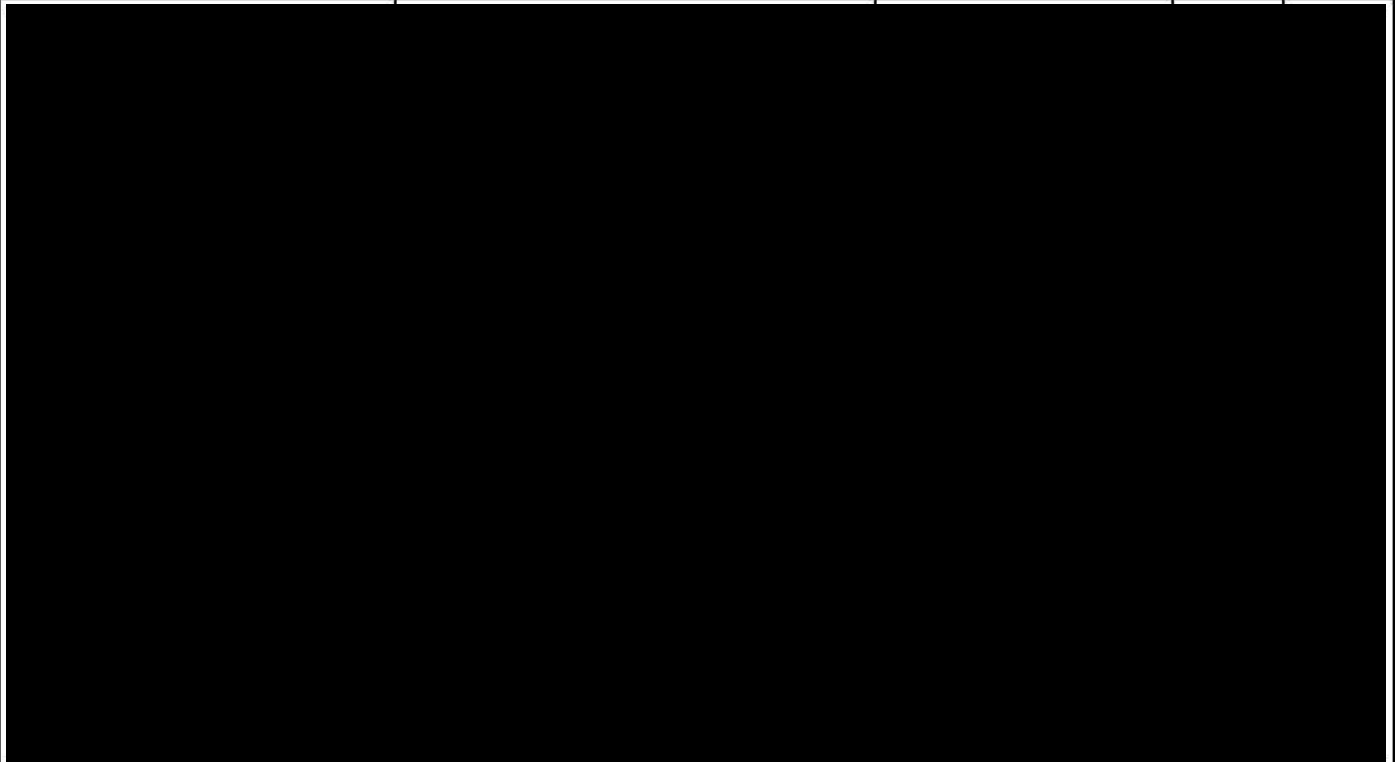
OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen;			
	Oct. 1, 2017 – Dec. 31, 2017	GOOG-PLAY-000619058	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	Jan. 1, 2018 – March 31, 2018	GOOG-PLAY-000619109	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	April 1, 2018 – Sept. 30, 2018	GOOG-PLAY-000619190	Hiroshi Lockheimer	“ ”	“ ”	“ ”		
	Oct. 1, 2018 – Sept. 30, 2020	GOOG-PLAY-000619306	Hiroshi Lockheimer					
	Oct. 1, 2020 – Sept. 30, 2022	GOOG-PLAY-000620892	Hiroshi Lockheimer					
Lenovo	July 1, 2010 – June 30, 2012	GOOG-PLAY-001089998	Andy Rubin, at -011	<p>2.2. License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (f) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7. Authorization to Distribute Google Applications on the Devices &amp; Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the</p>	<p>3.4. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the center (or otherwise default) panel of the Phone Top; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.</p>	<p>1.11</p> <ol style="list-style-type: none"> <li>1. Set-up Wizard,</li> <li>2. Google Phone-top Search,</li> <li>3. Gmail,</li> <li>4. Google Calendar,</li> <li>5. Google Talk,</li> <li>6. YouTube,</li> <li>7. Google Maps for Mobile,</li> <li>8. Google Street View,</li> <li>9. Contact Sync,</li> <li>10. Android Market Client (not products downloaded from Android Market),</li> <li>11. Google Voice Search, and</li> </ol>	12	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.		12. Network Location Provider.		
	July 1, 2012 – June 30, 2013	GOOG-PLAY-001089608	Andy Rubin	<p>2.2 License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (f) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7. Authorization to Distribute Google Applications on the Devices &amp; Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.</p>	<p>3.3. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) the Google Search widget and the Google Play Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) the Google Search widget must be set as the default search provider for all Web search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.</p>	<p>1.10</p> <ol style="list-style-type: none"> <li>1. Google Play Client (does not include products downloaded from Google Play),</li> <li>2. Calendar Sync,</li> <li>3. Contacts Sync,</li> <li>4. Gmail,</li> <li>5. Google+,</li> <li>6. Google Books,</li> <li>7. Google Calendar,</li> <li>8. Google Maps for Mobile,</li> <li>9. Google Music,</li> <li>10. Google Partner Setup,</li> <li>11. Google Search,</li> <li>12. Google Services Framework,</li> <li>13. Google Street View,</li> <li>14. Google Talk,</li> <li>15. Google Videos,</li> <li>16. Google Voice Search,</li> <li>17. Market Updater,</li> <li>18. Media Uploader,</li> <li>19. Network Location Provider,</li> <li>20. Set Up Wizard,</li> <li>21. YouTube, and</li> </ol>	22	

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						22. Widevine (requires separate agreement with Google).		
	Feb. 1, 2013 – March 31, 2017	MOTO-NDCAL-00000193	Jamie Rosenberg	“ ”	“ ”	“ ”		
	April 23, 2019	GOOG-PLAY-001089914	Jamie Rosenberg	Not pertinent amendment to EMADA effective Jan 14, 2019				
	Jan. 10, 2020	GOOG-PLAY-001089924	Jamie Rosenberg	“ ”	“ ”	“ ”		
	March 1, 2020- Dec. 31, 2020	GOOG-PLAY-001089952	Ija Ribakova					

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	May 15, 2020	GOOG-PLAY-001089978	Jamie Rosenberg					
	July 13, 2020	GOOG-PLAY-001089985	Jamie Rosenberg					

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Dec. 29, 2020	GOOG-PLAY-001089995	Jamie Rosenberg					
	Sept. 1, 2020	GOOG-PLAY-001090102	Jamie Rosenberg					
LG	June 1, 2009 – Dec. 31, 2010	GOOG-PLAY-000621177	Andy Rubin, at -184	<p>2.7(c) The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.</p>	<p>2.2 License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (h) operate or promote, or assist third parties in the operation or promotion of, any store, market, or similar method for the distribution of Android Products other than the Android Market.</p> <p>1.2 “Android Products” means software, content and digital materials designed for use on Android-based devices.</p> <p>Ex. A. 5 Android Market. Google must provide its written consent for any Conflicting Service to be preloaded on any Device. “Conflicting Service” means any application, product or service that is substantially similar to the Android Market Client. If Google consents to the preloading of any Conflicting Service, then the Android Market Client must be on the phone top. If the Android Market Client is not preloaded on a Device (due to Google’s prior written consent), then there shall not be a Conflicting Service preloaded on the Device. For clarity, the restrictions in this section do not apply to an End User prompted download of a Conflicting Service or an End User’s use of a Conflicting Service.</p>			



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Aug. 13, 2010	GOOG-PLAY-000621097	Andy Rubin, at -098	" "	" "			
	Jan. 1, 2011 – Dec. 31, 2012	GOOG-PLAY-000621085	Andy Rubin at -095	<p>2.2 License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (f) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7 The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.</p>	<p>3.4 Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.</p>	<p>1.11</p> <ol style="list-style-type: none"> <li>1. Set-up Wizard,</li> <li>2. Google Phone-top Search,</li> <li>3. Gmail,</li> <li>4. Google Calendar,</li> <li>5. Google Talk,</li> <li>6. YouTube,</li> <li>7. Google Maps for Mobile,</li> <li>8. Google Street View,</li> <li>9. Contact Sync,</li> <li>10. Android Market Client (not products downloaded from Android Market),</li> <li>11. Google Voice Search, and</li> <li>12. Network Location Provider.</li> </ol>	12	
	Jan. 1, 2013 – Dec. 31, 2014	LGUS-GOOGLE PLAY-00028821	Hiroshi Lockheimer	<p>2.2. License Grant Restrictions. Company shall not, and shall not allow any third party to: . . . (f) take any actions that may cause or result in the fragmentation of Android . . .</p> <p>2.7. Authorization to Distribute Google Applications on the Devices &amp; Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must</p>	<p>3.3. Placement Requirements. Unless otherwise approved by Google in writing, which shall not be unreasonably withheld, delayed or denied, Company shall: (1) preload all Google Applications approved for each Device's features and functionality in the applicable Territory or Territories on each Device; (2) preload the Google Search widget and the Google Play Client icon at least on the panel immediately adjacent to the Default Home Screen; (3) ensure that all other preloaded Google Applications are placed no more than one level below the Phone Top; and (4) ensure that Google Search is</p>	<ol style="list-style-type: none"> <li>1. Google Play Client (does not include products downloaded from Google Play),</li> <li>2. Calendar Sync,</li> <li>3. Contacts Sync,</li> <li>4. Gmail,</li> <li>5. Google+,</li> <li>6. Google Play Books,</li> <li>7. Google Calendar,</li> <li>8. Google Maps,</li> <li>9. Google Play Music,</li> <li>10. Google Partner Setup,</li> </ol>	24	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to including Launch.	set as the default search provider for all Web search access points on the Device; these include "assist", "search", "voice search" and "Web search" intents. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.	11. Google Search (including Google Now) 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Magazines, 18. Google Voice Search, 19. Market Updater, 20. Media Uploader, 21. Network Location Provider, 22. Set Up Wizard, 23. YouTube, and 24. Widevine (requires separate agreement with Google).		
	Through March 31, 2015	GOOG-PLAY-000617772	Hiroshi Lockheimer	" "	" "	" "		
	Through Aug. 31, 2015	GOOG-PLAY-000617807	Hiroshi Lockheimer	" "	" "	" "		
	Through Oct. 31, 2015	GOOG-PLAY-000617897	Hiroshi Lockheimer	" "	" "	" "		
	Through Jan. 31, 2016	GOOG-PLAY-000617907	Hiroshi Lockheimer	" "	" "	" "		
	Through May 31, 2016	GOOG-PLAY-000617921	Hiroshi Lockheimer	" "	" "	" "		

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Through Dec. 31, 2016	GOOG-PLAY-000617963	Hiroshi Lockheimer	" "	" "	" "		
	Through March 31, 2017	GOOG-PLAY-000618092	Jamie Rosenberg	" "	" "	" "		
	Through June 30, 2017	GOOG-PLAY-000618258	Jamie Rosenberg	" "	" "	" "		
	July 1, 2017 – June 30, 2019	GOOG-PLAY-000618341	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term ...	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by	Listed in Google Product Geo Availability Chart		4.5.

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Google) are available as instructed by Google; [requirements continue]			
	Aug. 23, 2017	GOOG-PLAY-000618541	Jamie Rosenberg	“ ”	<p>2(a) For V30 Device and derivatives, “if Company chooses to remove all application icons from the Default Home Screen, Company may choose not to preload a folder with specific Google Applications (“Folder”) on the Default Home Screen pursuant to Section 4.4(b)(iii) of the MADA. . .”</p> <p>(b) If company removes all application icons from the Default Home Screen for the V30, it must:</p> <p>(i) Place the Folder on the first row and top-left location of the Second Screen (which is one level away from the Default Home Screen);</p> <p>(ii) Place the Google-provided widget, which may be the rounded widget, on the Default Home Screen. This widget must be placed on either the top or bottom of the Default Home Screen. Additionally, the search services API must be implemented, and the appropriate Setup Wizard configured for the Google Search application;</p> <p>(iii) Place the Play Store, Chrome Browser, and Android Messages (for SKUs specified and agreed to in the RCS Agreement) applications in the Application Dock, which must be installed in the system partition;</p> <p>(iv) Ensure that the V30 uses Play Auto-Install (PAI) or another mechanism chosen by Company, whereby if for any reason the Device is reset, all Core Applications and Flexible Applications can be restored to the original placement</p>	“ ”		



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					requirements of Section 4.4(b) of the MADA. (v) [included illustrative of requirements]			
	April 25, 2018	GOOG-PLAY-000619144	Jamie Rosenberg	“ ”	2. Amendment a) [For G7 device,] “if Company chooses to remove all application icons from the Default Home Screen, Company may choose not to preload a folder with specific Google Applications ... on the Default Home Screen ... b) If Company removes all application icons from the Default Home Screen for Neo, it must: i) Place the Folder on the first row and top-left location of the Second Screen or application tray (which is one level away from the Default Home Screen); ii) Place the Google-provided widget ... on the Default Home Screen. ... iii) Place the Play Store, Chrome Browser, and Android Messages ... applications in the Application Dock ... iv) [capability to restore Core Applications and Flexible Applications to original placement requirements of Section 4.4(b) of the MADA in case of device reset] v) [placements of Google Applications specified below and illustrated in Exhibit A]	“ ”		
	May 4, 2018	GOOG-PLAY-000619149	Jamie Rosenberg	“ ”	Android GO/Low Ram Device placement requirements, same as prime MADA except: (a) Distribute all Android Go Applications approved in the applicable Territory or Territories in accordance with the Low Ram Device Application Availability Chart	“ ”		

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(b) Specific placement for Go Applications similar to above			
	May 2, 2018	GOOG-PLAY-000619161	Jamie Rosenberg	" "	Device succeeding V30 ("Emma"), same as V30 above	" "		
	April 3, 2018	GOOG-PLAY-000619165	Jamie Rosenberg	" "	LG Signature Device, allows LG to redesign Google Application icons with Google approval to black-and-white theme; must not set as default, must limit distribution of LG Signature Devices to a total of three hundred devices in only Korea	" "		
	June 27, 2019 – Sept. 30, 2019	GOOG-PLAY-000619866	Jamie Rosenberg	Same as GOOG-PLAY-000618341	Same as GOOG-PLAY-000618341	Same as GOOG-PLAY-000618341		
	Through Nov. 30, 2019	GOOG-PLAY-000620111	Jamie Rosenberg	" "	" "	" "		
	Through Dec. 31, 2019	GOOG-PLAY-000620332	Jamie Rosenberg	" "	" "	" "		
	Through Dec. 31, 2020	GOOG-PLAY-000620369	Jamie Rosenberg	" "	Modifications to GOOG-PLAY-000618341: Unless otherwise agreed . . . all Flexible Applications must be installed in the user partition and enable Play Auto Installs. However, if Company makes a Flexible Application the default functionality of such type of application on the Device, then such Flexible Application must be installed in the system partition.	" "		Deleted
	Oct. 29, 2018 – Dec. 31, 2019	GOOG-PLAY-000619484	Jamie Rosenberg	EMADA "subject to Company being in compliance with a valid and effective Android Compatibility Commitment" (2.1)	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all	Listed in Google Product Geo Availability Chart		4.5

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) the Google Play Store icon; and (ii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; [requirements continue]			
	Through Dec. 31, 2020	GOOG-PLAY-000620360	Jamie Rosenberg					
Micromax	April 1, 2014 – March 31, 2015	GOOG-PLAY-000617626	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. a) The license to distribute Google Applications in Section 2.1 is	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play),	27	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device. Company will work with 3PL in order to conduct compatibility testing.	Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents; (e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (f) (initial Device set-up); (g) (logo in boot sequence); (h) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (i) (no changes to Google accounts and services; "as discoverable" parity)]	<ol style="list-style-type: none"> <li>2. Calendar Sync,</li> <li>3. Contacts Sync,</li> <li>4. Gmail,</li> <li>5. Google+ (including Google+ Photos),</li> <li>6. Google Play Books,</li> <li>7. Google Calendar,</li> <li>8. Google Maps,</li> <li>9. Google Play Music,</li> <li>10. Google Partner Setup,</li> <li>11. Google Search (including Google Now),</li> <li>12. Google Chrome,</li> <li>13. Google Services Framework,</li> <li>14. Google Street View,</li> <li>15. Google Talk,</li> <li>16. Google Play Movies,</li> <li>17. Google Play Magazines,</li> <li>18. Google Play Games,</li> <li>19. Google Drive,</li> <li>20. Google Backup and Restore,</li> <li>21. Google Voice Search,</li> <li>22. Media Uploader,</li> <li>23. Network Location Provider,</li> <li>24. Set Up Wizard,</li> <li>25. YouTube,</li> <li>26. Google WebView Component, and</li> <li>27. Widevine (requires separate agreement with Google).</li> </ol>		



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	July 1, 2015 – June 30, 2017	GOOG-PLAY-000617820	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. a) The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget at the top of such screen; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen on each Device; (d) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (e) (initial Device set-up); (f) (logo in boot sequence); (g) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs")]	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Newsstand, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard,	27	

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	Oct. 28, 2016	GOOG-PLAY-000618062	Philipp Schindler	“ ”	“ ”	“ ”		
	July 1, 2017 – June 30, 2019	GOOG-PLAY-000618726	Philipp Schindler	“subject to Company being in compliance with a valid and effective Android Compatibility Commitment . . .” (2.1)	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by	1.12 “Core Applications”: 1. Search 2. Chrome 3. Gmail 4. Maps 5. YouTube 6. Play 1.21 “Google Applications”: 7. Core Applications 8. Flexible Applications 9. Google Product Geo Availability Chart		4.5



**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Google) are available as instructed by Google; [requirements continue]			
	July 1, 2019 – June 30, 2020	GOOG-PLAY-000619949	Hiroshi Lockheimer					
OnePlus	April 1, 2014 – March 31, 2015	GOOG-PLAY-000416327	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. a) The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device. Company will work with 3PL in order to conduct compatibility testing.	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents; and (e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (f) (initial Device set-up); (g) (logo in boot sequence); (h) (Google WebView Component preload, default, and "sole provider for the	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Magazines, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore,	27	

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					webpage-rendering APIs"; (i) (no changes to Google accounts and services; "as discoverable" parity)]	21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	Sept. 1, 2015 – Nov. 30, 2015	GOOG-PLAY-000416398	Hiroshi Lockheimer	1.1(c) "Android Compatible Device(s)" means Device(s) that: (i) comply with the Android Compatibility Definition document (which may be updated from time to time), which can be found at the Android compatibility website ( <a href="http://source.android.com/compatibility">http://source.android.com/compatibility</a> ); and (ii) successfully pass the Android Compatibility Test Suite (CTS).	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget at the top of such screen; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen on each Device; (d) ensure that each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (e) (initial Device set-up); (f) (logo in boot	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk,	27	



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					sequence); (g) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (h) (no changes to Google accounts and services; "as discoverable" parity))]	16. Google Play Movies, 17. Google Play Newsstand, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	Through Feb. 29, 2016	GOOG-PLAY-000416420	Hiroshi Lockheimer	" "	" "	" "		
	Through June 30, 2016	GOOG-PLAY-000416441	Hiroshi Lockheimer	" "	" "	" "		
	Through Jan. 31, 2017	GOOG-PLAY-003604713	Jamie Rosenberg	" "	" "	" "		
	Through June 30, 2017	GOOG-PLAY-000416447	Jamie Rosenberg	" "	" "	" "		
	Aug. 1, 2017 – July 30, 2019	GOOG-PLAY-000416477	Jamie Rosenberg	2.1 License to the Google Applications. ...subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to	Listed in Google Product Geo Availability Chart		4.5

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				nontransferable, nonexclusive, no cost license during the Term . . . ; (1.3) – complies with the Android Compatibility Definition Document ( <a href="http://source.android.com/compatibility">http://source.android.com/compatibility</a> )	configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; ... (o) [home button animation]; (p) implement the Google Hotword if the device supports Hotwords (including support when screen is off)			
	Through Oct. 31, 2019	GOOG-PLAY-000416594	Jamie Rosenberg	“ ”	“ ”	“ ”		
	Nov. 1, 2019 – Nov 1, 2020	GOOG-PLAY-000416595	Jamie Rosenberg					

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Dec. 1, 2018 – Dec. 31, 2019	GOOG-PLAY-000416537	Hiroshi Lockheimer	EMADA - 2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement including compliance with Section 2.4 (License Limitations) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive license during the Term	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) the Google Play Store icon; and (ii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; . . . (g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access	Listed in Google Product Geo Availability Chart		4.5



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Assist App]; . . . (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; . . . (o) home button animation; (p) implement Google Hotword			
	Dec. 16, 2019 – Dec. 31, 2020	GOOG-PLAY-000416698	Hiroshi Lockheimer					
OPPO	Oct. 1, 2012 – Sept. 30, 2013	GOOG-PLAY-000416258	Andy Rubin	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	3.3 Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) the Google Search widget and the Google Play Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) the Google Search widget must be set as the default search provider for all Web search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.	1.10. "Google Applications" 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+, 6. Google Books, 7. Google Calendar, 8. Google Maps for Mobile, 9. Google Music, 10. Google Partner Setup, 11. Google Search, 12. Google Services Framework, 13. Google Street View, 14. Google Talk, 15. Google Videos,		

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						16. Google Voice Search, 17. Market Updater, 18. Media Uploader, 19. Network Location Provider, 20. Set Up Wizard, 21. YouTube, and 22. Widevine (requires separate agreement with Google).  1.15. "Optional Google Applications" 1. Orkut 2. Google Wallet 3. Google Shopper 4. Google Earth 5. Finance 6. News & Weather 7. Google Voice		
	April 1, 2015 – March 31, 2016	GOOG-PLAY-000416373	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget at the top of such screen; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup,	27	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	more than one level below the Home Screen on each Device; (d) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (e) (initial Device set-up); (f) (logo in boot sequence); (g) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (h) (no changes to Google accounts and services; "as discoverable" parity)]	11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Magazines, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google Webview Component, and 27. Widevine (requires separate agreement with Google).		
	Oct. 5, 2016	GOOG-PLAY-000416444	Jamie Rosenberg	**Nonsubstantive amendments to MADA dated 9/1/16				
Sharp	Dec. 1, 2011 – Nov. 30, 2013	GOOG-PLAY-000416789	Andy Rubin	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible	3.4 Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be	1.11 1. Set-up Wizard, 2. Google Phone-top search, 3. Gmail, 4. Google Calendar, 5. Google Talk,	12	

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all Web search access points on the Device. Notwithstanding the foregoing, there are no placement requirements for Optional Google Applications.	6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market, Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider		
	Through March 31, 2016	GOOG-PLAY-000416419	Hiroshi Lockheimer	**Term amendment to MADA dated Jan. 1, 2014				
	Through July 31, 2016	GOOG-PLAY-000416442	Hiroshi Lockheimer	" "	" "	" "		
	Through Jan. 31, 2017	GOOG-PLAY-000416443	Jamie Rosenberg	" "	" "	" "		
	Through March 31, 2017	GOOG-PLAY-000416445	Jamie Rosenberg	" "	" "	" "		
	Through June 30, 2017	GOOG-PLAY-000416446	Jamie Rosenberg	" "	" "	" "		
	Through Aug. 31, 2017	GOOG-PLAY-000416453	Jamie Rosenberg	" "	" "	" "		
	Sept. 1, 2017 – Aug. 31, 2019	GOOG-PLAY-000416454	Hiroshi Lockheimer	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all	Listed in Google Product Geo Availability Chart		4.5

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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	<p>Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray):</p> <p>(i) a Google-provided widget;</p> <p>(ii) the Google Play Store icon; and</p> <p>(iii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).</p> <p>(c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen;</p> <p>(d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google;</p> <p>. . .</p> <p>(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; . . . (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; . . . (o) home button animation; (p) implement Google Hotword</p>			
	Through Sept. 30, 2019	GOOG-PLAY-000416588	Jamie Rosenberg	" "	" "	" "		" "



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Oct. 29, 2018 – Dec. 31, 2019	GOOG-PLAY-000416562	Hiroshi Lockheimer	EMADA “subject to Company being in compliance with a valid and effective Android Compatibility Commitment” (2.1)	<p>4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) the Google Play Store icon; and (ii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; . . . .</p> <p>(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; . . . (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android</p>	Listed in Google Product Geo Availability Chart		4.5

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					SDK; . . . (o) home button animation; (p) implement Google Hotword			



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
TCL	June 1, 2010 – May 31, 2012	GOOG-PLAY-000621050	Andy Rubin	The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device.	3.4(a) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (b) Google Phone Top Search and Android Market Client must be placed at least on the panel immediately adjacent to the centre (or otherwise default) panel of the Phone Top; (c) all other Google Applications will be placed no more than one level below the Phone Top; and (d) Google Phone Top Search must be set as the default search provider for all search access points on Devices.	1.11 1. Set-up Wizard, 2. Google Phone-Top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider	12	
	June 1, 2012 – May 31, 2014	GOOG-PLAY-000617393	Andy Rubin	2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is	3.3. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device;	1.12 1. Google Play Client (does not include products	22	

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	(2) the Google Search widget and the Google Play Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) the Google Search Widget must be set as the default search provider for all Web search access points on the Device.	downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+, 6. Google Books, 7. Google Calendar, 8. Google Maps for Mobile, 9. Google Music, 10. Google Partner Setup, 11. Google Search, 12. Google Services Framework, 13. Google Street View, 14. Google Talk, 15. Google Videos 16. Google Voice Search, 17. Market Updater 18. Media Uploader, 19. Network Location Provider, 20. Set Up Wizard, 21. YouTube, and 22. Widevine (requires separate agreement with Google).		
	June 1, 2014 – May 31, 2016	GOOG-PLAY-000617593	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded "Google" that	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync,	27	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents; (e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (f) (initial Device set-up); (g) (logo in boot sequence); (h) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (i) (no changes to Google accounts and services; "as discoverable" parity)]	<ol style="list-style-type: none"> <li>4. Gmail,</li> <li>5. Google+ (including Google+ Photos),</li> <li>6. Google Play Books,</li> <li>7. Google Calendar,</li> <li>8. Google Maps,</li> <li>9. Google Play Music,</li> <li>10. Google Partner Setup,</li> <li>11. Google Search (including Google Now),</li> <li>12. Google Chrome,</li> <li>13. Google Services Framework,</li> <li>14. Google Street View,</li> <li>15. Google Talk,</li> <li>16. Google Play Movies,</li> <li>17. Google Play Newsstand,</li> <li>18. Google Play Games,</li> <li>19. Google Drive,</li> <li>20. Google Backup and Restore,</li> <li>21. Google Voice Search,</li> <li>22. Media Uploader,</li> <li>23. Network Location Provider,</li> <li>24. Set Up Wizard,</li> <li>25. YouTube,</li> <li>26. Google WebView Component, and</li> <li>27. Widevine (requires separate agreement with Google).</li> </ol>		

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Through July 31, 2016	GOOG-PLAY-000617962	Hiroshi Lockheimer	" "	" "	" "		
	Through Jan. 31, 2017	GOOG-PLAY-000618017	Jamie Rosenberg	" "	" "	" "		
	Through March 31, 2017	GOOG-PLAY-000618095	Jamie Rosenberg	" "	" "	" "		
	Through June 30, 2017	GOOG-PLAY-000618255	Jamie Rosenberg	" "	" "	" "		
	Through Aug. 31, 2017	GOOG-PLAY-000618582	Jamie Rosenberg	" "	" "	" "		
	Sept. 1, 2017 – Aug. 31, 2019	GOOG-PLAY-000618633	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	4.3 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application	Listed in Google Product Geo Availability Chart		4.4



**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					<p>or a Flexible Application, is placed no more than one level below the Default Home Screen;</p> <p>(d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google;</p> <p>...</p> <p>(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; ... (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; ... (o) home button animation; (p) implement Google Hotword</p>			
	Through Nov. 30, 2019	GOOG-PLAY-000620097	Jamie Rosenberg	" "	" "	" "		" "
	Dec. 1, 2019	GOOG-PLAY-000620334	Jamie Rosenberg	" "	Delete (o)	" "		Deleted
	Dec. 1, 2018 – Dec. 31, 2019	GOOG-PLAY-000619514	Hiroshi Lockheimer	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement including compliance with Section 2.4 (License Limitations) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive license during the Term...	4.4 Placement Requirements; Device Setup. ... Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (b) distribute on the	Listed in Google Product Geo Availability Chart		

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					<p>Default Home Screen (but excluding the lockscreen and notification tray):</p> <p>(i) the Google Play Store icon; and</p> <p>(ii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).</p> <p>(c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen;</p> <p>(d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google;</p> <p>...</p> <p>(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; ... (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; ... (o) home button animation; (p) implement Google Hotword</p>			
Transsi on	Feb. 1, 2015 – Jan 31, 2017	GOOG-PLAY-000617778	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device, Each Device must become an Android Compatible	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget at the top of such screen; (ii) an icon clearly labeled or	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail,	27	



**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen on each device; (d) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (e) (initial Device set-up); (f) (logo in boot sequence); (g) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (h) (no changes to Google accounts and services; "as discoverable" parity)]	5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Magazines, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Feb. 1, 2017 – July 31, 2017	GOOG-PLAY-000618100	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will, or will ensure that 3PL will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget at the top of such screen; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen on each Device; (d) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (e) (initial Device set-up); (f) (logo in boot sequence); (g) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (h) (no changes to Google accounts and services; "as discoverable" parity)]	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Magazines, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search, 22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard,		



**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
						25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	Aug. 1, 2017 – Aug. 31, 2019	GOOG-PLAY-000618583	Philipp Schindler	2.1 License to the Google Applications. . . .subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; . . .	Listed in Google Product Geo Availability Chart		4.5

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; . . . (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; . . . (o) home button animation; (p) implement Google Hotword			
	Through Nov. 30, 2019	GOOG-PLAY-000619896	Hiroshi Lockheimer	" "	" "	" "		" "
	Oct. 29, 2018 – Dec. 31, 2019	GOOG-PLAY-000619401	Hiroshi Lockheimer	EMADA: 2.1 License to the Google Applications. . . . subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive license during the Term . . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) the Google Play Store icon; and (ii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen;	Listed in Google Product Geo Availability Chart		4.5

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					<p>(d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google;</p> <p>...</p> <p>(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; ... (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; ... (o) home button animation; (p) implement Google Hotword</p>			
Vivo	Aug 1, 2017 – July 31, 2019	GOOG-PLAY-000618681	Jamie Rosenberg	2.1 License to the Google Applications. ... subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term ...	<p>4.4 Placement Requirements; Device Setup. ... Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray):</p> <p>(i) a Google-provided widget;</p> <p>(ii) the Google Play Store icon; and</p> <p>(iii) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).</p>	Listed in Google Product Geo Availability Chart		4.5



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; . . . . (g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; . . . (l) preload Google-provided Android WebView as the default provider for the webpage-rendering APIs as defined in the Android SDK; . . . (o) home button animation; (p) implement Google Hotword			
	Through Oct. 31, 2019	GOOG-PLAY-000620054	Jamie Rosenberg	“ ”	“ ”	“ ”		“ ”
Wiko	Aug. 1, 2017 – July 31, 2018	GOOG-PLAY2-000456776	Hiroshi Lockheimer	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget;	Listed in Google Product Geo Availability Chart		



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					<p>(ii) the Google Play Store icon; and</p> <p>(iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing).</p> <p>(c) ensure that any distributed Google Application that is not a Core Application is placed no more than one level below the Default Home Screen;</p> <p>(d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google;</p> <p>...</p> <p>(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; ... (l) preload Google-provided Android WebView as the default provider for webpage-rendering APIs as defined in the Android SDK; ...</p> <p>(o) home button animation; (p) implement Google Hotword</p>			
Xiaomi	March 1, 2013 – Feb. 28, 2015	GOOG-PLAY-000617431	Hiroshi Lockheimer	2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build	3.3. Placement Requirements. Unless otherwise approved by Google in writing Company shall (1) preload all Google applications approved in the applicable Territory or Territories on each Device; (2) preload the Google Search widget and the Google Play Client (using the icons or affordances provided by Google) on the Default Home Screen of each Device; (3) ensure that all other preloaded Google Applications are placed no more than one level below the Phone Top; (4) ensure	1.12 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ 6. Google Play Books, 7. Google Calendar,	24	

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	that Google Search is set as the default search provider for all Web search access points, intents and requests on the Device; these include "assist", "search", "voice search" and "Web search" intents; and (5) ensure each Device shall launch Google Search from the "Home" action or button, by swiping up (for soft keys) or long pressing (for hard keys), and shall launch Google Voice Search by long pressing the "Search" key (if present).	8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Magazines, 18. Google Voice Search, 19. Market Updater, 20. Media Uploader, 21. Network Location Provider, 22. Set Up Wizard, 23. YouTube, and 24. Widevine (requires separate agreement with Google).		
	Through April 30, 2015	GOOG-PLAY-000617798	Hiroshi Lockheimer	" "	" "	" "		
	Through Sept. 30, 2015	GOOG-PLAY-000617841	Hiroshi Lockheimer	" "	" "	" "		
	Through Jan. 31, 2016	GOOG-PLAY-000617910	Hiroshi Lockheimer	" "	" "	" "		

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Through May 31, 2016	GOOG-PLAY-000617926	Hiroshi Lockheimer	" "	" "	" "		
	Through Oct. 31, 2016	GOOG-PLAY-000617965	Hiroshi Lockheimer	" "	" "	" "		
	Through Feb. 28, 2017	GOOG-PLAY-000618065	Jamie Rosenberg	" "	" "	" "		
	Through June 30, 2017	GOOG-PLAY-000618259	Jamie Rosenberg	" "	" "	" "		
	Through Aug. 31, 2017	GOOG-PLAY-000618725	Jamie Rosenberg	" "	" "	" "		
	Through Oct. 30, 2017	GOOG-PLAY-000619045	Jamie Rosenberg	" "	" "	" "		
ZTE	July 1, 2011 – June 30, 2013	GOOG-PLAY-000621122	Andy Rubin	2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	3.4. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all Web search access points on the Device.	1.11 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View, 9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider	12	



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Feb. 1, 2012	GOOG-PLAY-000621165	Andy Rubin	Nonsubstantive amendments				
	Jan. 1, 2014 – Dec. 31, 2015	GOOG-PLAY-000617522	Hiroshi Lockheimer	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices running Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device.	3.3 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the applicable Territories on each Device; (b) preload on the Default Home Screen of each Device: (i) the Google Search widget; (ii) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing); and (iii) the Google Play Client icon; (c) ensure that all other Google Applications are preloaded and placed no more than one level below the Home Screen; (d) set Google Search as the default search provider for all Web search access points, intents, and requests on the Device, including "assist", "search", "voice search", and "Web search" intents; (e) ensure each Device allows an End User to directly access Google Search by either: (i) long pressing the "Home" button on Devices with physical navigation buttons, or (ii) by swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; [continues with (f) (initial Device set-up); (g) (logo in boot sequence); (h) (Google WebView Component preload, default, and "sole provider for the webpage-rendering APIs"; (i) (no changes to	1.1(m) 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Calendar, 8. Google Maps, 9. Google Play Music, 10. Google Partner Setup, 11. Google Search (including Google Now), 12. Google Chrome, 13. Google Services Framework, 14. Google Street View, 15. Google Talk, 16. Google Play Movies, 17. Google Play Newsstand, 18. Google Play Games, 19. Google Drive, 20. Google Backup and Restore, 21. Google Voice Search,	27	

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Google accounts and services; "as discoverable" parity)]	22. Media Uploader, 23. Network Location Provider, 24. Set Up Wizard, 25. YouTube, 26. Google WebView Component, and 27. Widevine (requires separate agreement with Google).		
	Aug. 1, 2015 – July 31, 2017	GOOG-PLAY-000617842	Marco Borla (for Android China Application Store)	2.7 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	3.4 Placement Requirements. Unless Google otherwise approves in writing, Company will: (a) preload all Google Applications approved in the Territory on each Device; (b) preload on the Default Home Screen of each Device: the Google China App Store icon; (c) [initial device setup]; (d) [Google TM on initial screen]; (e) ...ensure that the settings for Google China App Store accounts and services are not modified and are as discoverable as those of Company or any third party.	1.1(p) 1. Google China App Store Client (does not include products downloaded from Google China App Store), 2. and App Developer Services		
	Jan. 8, 2016	GOOG-PLAY-000617920	Hiroshi Lockheimer	Illegible amendment				
	Through Nov. 30, 2016	GOOG-PLAY-000617996	Jamie Rosenberg	Extension of Jan. 1, 2014 MADA				
	Through April 30, 2017	GOOG-PLAY-000618066	Jamie Rosenberg	" "				
	Through July 31, 2017	GOOG-PLAY-000618553	Jamie Rosenberg	" "				



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Aug. 1, 2017 – July 31, 2019	GOOG-PLAY-000618658	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement (including compliance with Section 2.3) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive, no cost license during the Term . . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) a Google-provided widget; (ii) the Google Play Store icon; and (iii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; . . . . (o) [home button animation]; (p) implement the Google Hotword if the device supports Hotwords (including support when screen is off)	Listed in Google Product Geo Availability Chart		4.5



**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Nov. 6, 2018	GOOG-PLAY-000619452	Jamie Rosenberg	Nonsubstantive amendment				
	Through Nov. 30, 2019	GOOG-PLAY-000620098	Jamie Rosenberg	Term amendment				
	Oct. 29, 2018 – Dec. 31, 2019	GOOG-PLAY-000619579	Jamie Rosenberg	2.1 License to the Google Applications. Subject to the terms and conditions of this Agreement including compliance with Section 2.4 (License Limitations) and the GMS Requirements, and subject to Company being in compliance with a valid and effective Android Compatibility Commitment, Google grants to Company a nontransferable, nonexclusive license during the Term . .	4.4 Placement Requirements; Device Setup. . . . Company agrees to the following placement and setup requirements with respect to Android Compatible Devices distributed or launched during the Term that it elects to configure as Devices: (a) distribute all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (b) distribute on the Default Home Screen (but excluding the lockscreen and notification tray): (i) the Google Play Store icon; and (ii) an icon clearly labeled or branded “Google” that provides direct access to the Core Applications and Flexible Applications (using the icons and text Google provides or approves in writing). (c) ensure that any distributed Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (d) ensure that the Google Terms of Service, Privacy Policy and Legal Notice (which will be provided to Company by Google) are available as instructed by Google; . . .	Listed in Google Product Geo Availability Chart		4.5

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(g) set Google as the default Assist App and follow the Google-provided set-up screen guidelines; (h) [long press and long touch activities will directly access Assist App]; . . . (l) preload Google-provided Android WebView as the default provider for webpage-rendering APIs as defined in the Android SDK; . . . (o) home button animation; (p) implement Google Hotword			
Samsung	Sept. 16, 2010	GOOG-PLAY-003604438	Andy Rubin	AMENDMENT, no compatibility in this doc	8. Section 3 (Placement Requirements) of Exhibit A is hereby deleted and replaced with the following: "3. Placement Requirements: . . . Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all search access points on the Device..."	Not in amendment		
	Jan. 1, 2011 – Dec. 31, 2012	GOOG-PLAY4-000034628	Andy Rubin	2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the	3.4. Placement Requirements. Unless otherwise approved by Google in writing: (1) Company will preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) Google Phone-top Search and the Android Market Client icon must be placed at least on the panel immediately adjacent to the Default Home Screen; (3) all other Google Applications will be placed no more than one level below the	1.12 1. Set-up Wizard, 2. Google Phone-top Search, 3. Gmail, 4. Google Calendar, 5. Google Talk, 6. YouTube, 7. Google Maps for Mobile, 8. Google Street View,	12	



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**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
				Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch.	Phone Top; and (4) Google Phone-top Search must be set as the default search provider for all search access points on the Device.	9. Contact Sync, 10. Android Market Client (not products downloaded from Android Market), 11. Google Voice Search, and 12. Network Location Provider		
	June 1, 2014 – May 31, 2016	GOOG-PLAY-003604122	Hiroshi Lockheimer	2.7. Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Device becoming an Android Compatible Device. Each Device must become an Android Compatible Device at least 30 days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices developed specifically to run on Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device, unless Google agrees otherwise.	3.3. Placement Requirements. Unless otherwise approved by Google in writing, Company shall: (1) preload all Google Applications approved in the applicable Territory or Territories on each Device; (2) preload on the Default Home Screen of each Device: (a) the Google Search widget, (b) an icon clearly labeled or branded "Google" that provides direct access to a collection of icons for the Google Applications specified in Exhibit A (using the icons and text Google provides or approves in writing), and (c) the Google Play Client; (3) ensure that all other preloaded Google Applications are placed no more than one level below the Home Screen; (4) set Google Search as the default search provider when calls to the following web search access or assist intents are made: android.intent.action.WEB_SEARCH, android.intent.action.ASSIST, android.search.action.GLOBAL_SEARCH, android.speech.action.WEB_SEARCH, relative to preloaded applications (5) ensure each Device allows an End User to directly access Google Search by either (a) long	1.14 1. Google Play Client (does not include products downloaded from Google Play), 2. Calendar Sync, 3. Contacts Sync, 4. Gmail, 5. Google+ (including Google+ Photos), 6. Google Play Books, 7. Google Maps, 8. Google Play Music, 9. Google Partner Setup, 10. Google Search (including Google Now), 11. Google Chrome, 12. Google Services Framework, 13. Google Street View, 14. Google Talk, 15. Google Play Movies, 16. Google Play Newsstand, 17. Google Play Games,	27	

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					<p>pressing the "Home" button on Devices with physical navigation buttons, or (b) swiping up on either the navigation bar or "Home" button on Devices with soft navigation buttons; (6) with respect to initial Device setup, initiate Google account login via the Set-Up Wizard, Google account setup must be the first account for the End User to sign into after establishing network connectivity (b) present End User with both Google location and Google Backup and Restore settings, neither of which Company may modify, unless the parties mutually agree a privacy issue must be addressed, (c) follow Google's provided guidelines, and (d) allow End User to skip all account logins, including Google, Company and third-party logins; (7) display the Google Trademark (of which Google will determine in its sole discretion) on the initial screen during the Device boot sequence for each Device shipped during the Term. Company's use and display of the Google Trademark must be approved in accordance with Section 7.2; (8) preload Devices with Google WebView Component (as Google makes it available) as the default provider for the webpage-rendering APIs as defined in the Android SDK, and (9) within the Device settings, ensure that the settings for Google accounts and services are not modified and are as discoverable as those of Company or any third party. Notwithstanding the foregoing, the requirements in this Section 3.3 go into effect only on new Device models Launched after March 1st, 2014, provided</p>	<p>18. Google Drive, 19. Google Backup and Restore, 20. Google WebView Component, 21. Google Voice Search, 22. Market Updater, 23. Media Uploader, 24. Network Location Provider, 25. Set Up Wizard, 26. YouTube, 27. Widevine, and 28. Anything on Geo Availability Document</p>		



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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					however that Section 3.3 (8) only applies to new Device models running Android version 4.4 or later.			
	April 7, 2017	GOOG-PLAY-003604477	Jamie Rosenberg	S8 amendment	<p>2. b) If Samsung removes all application icons from the Default Home Screen,</p> <p>Place the Folder on the first row of the application tray, which is one level away from the Default Home Screen</p> <p>Specific placements based on US/non-US and Telecom Operator/non-Telecom Operator devices</p>	" "		
	Jan 22, 2018	GOOG-PLAY-003604490	Jamie Rosenberg	S9 amendment	<p>2. b) If Samsung removes all application icons from the Default Home Screen,</p> <p>Place the Folder on the first row of the application tray, which is one level away from the Default Home Screen</p> <p>Play Store icon must be placed in the device hotseat</p> <p>Specific placements based on US/non-US and Telecom Operator/non-Telecom Operator devices</p> <p>Placed in the Edge Panel: Duo, Chrome, Google Maps, YouTube</p>	" "		
	June 11, 2018	GOOG-PLAY-003604185	Philipp Schindler	GS9 amendment	<p>2. b) Place the Folder on the first row of the application tray, which is one level away from the Default Home Screen.</p> <p>Play Store application must be placed in the device hotseat</p>	" "		

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					Specific adjustments to general placement based on telecom-operator device or not (and w/in US or not)			
	Feb. 27, 2019 – Dec. 31, 2019	GOOG-PLAY-003604203	Jamie Rosenberg	2.8 Authorization to Distribute Google Applications on the Devices & Compatibility. The license to distribute Google Applications in Section 2.1 is contingent upon the Android Compatible Device becoming a Device. Each Device must become an Android Compatible Device at least thirty (30) days prior to the Final Embed Date of the Device. The final software build on Devices must pass the Compatibility Test Suite prior to Launch. In addition, other devices developed specifically to run on Android, including those that do not have preloaded Google Applications, must pass the Compatibility Test Suite prior to Company's commercial distribution of such device, unless Google agrees otherwise.	3.3 Placement Requirements; Device Setup. Unless otherwise approved by Google in writing, for each Device, Company will: (1) preload all Core Applications and Flexible Applications approved in the applicable Territory or Territories in accordance with the Google Product Geo Availability Chart for the EEA; (2) preload on the Default Home Screen (excluding the lock and notification screens): (a) an icon clearly labeled or branded "Google" that provides direct access to the Core Applications and Flexible Applications; and (b) the Google Play Client. (3) ensure that, where applicable, any preloaded Google Application that is not a Core Application or a Flexible Application, is placed no more than one level below the Default Home Screen; (4) set Google as the default provider for the assist intent (currently android.intent.action.assist), but if a non-Google app uses the assist intent, the parties agree to discuss whether Google should be the default provider; (5) ensure that any and all long press and long touch activities of the "Home" button on Devices with physical or soft navigation buttons will directly access Google. Notwithstanding the foregoing, (i) if Company uses the "Home" button area for fingerprint authentication, then	Listed in Google Product Geo Availability Chart		



**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					<p>during the authentication process, Samsung may reassign long touch and/or long press to fingerprint authentication (provided any non-reassigned activities continue to directly access Google) and then reassign such activity or activities to Google after authentication, and (ii) the parties may mutually agree in writing to reassign one of either long press or long touch activity on the "Home" button to another functionality;</p> <p>(6) with respect to initial Device set-up:</p> <p>(a) initiate Google account login via the Set-up Wizard; Google account setup must be the first account for the End User to sign into after establishing network connectivity; (b) present End User with both location and Google Backup and Restore settings, neither of which Company may modify, unless the parties mutually agree a privacy issue must be addressed, (c) follow Google's provided guidelines, and (d) allow End User to skip all account logins, including Google, Company and third-party logins;</p> <p>(7) display the Google Trademark (which Google will determine in its sole discretion) on the initial screen during the Device boot sequence for each Device shipped during the Term. Company's use and display of the Google Trademark must be approved in accordance with Section 7.2;</p> <p>(8) preload Devices with Android Web View as the default provider for the webpage-rendering APIs as defined in the Android SOK; and</p>			

**Appendix D**  
**Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
					(9) within the Device settings, ensure that the settings for Google accounts and services are not modified and are as discoverable as those of Company or any third party.			
	April 11, 2019	GOOG-PLAY-003604239	Jamie Rosenberg	Galaxy Fold amendment	<p>2. b) If Samsung removes all application icons from the Default Home Screen,</p> <p>Place the Folder on the first row of the application tray, which is one level away from the Default Home Screen</p> <p>Play Store icon must be placed in the device hotseat. When the Galaxy Fold is in its unfolded state, the Play Store application must be placed in the device hotseat.</p> <p>Specific placements based on US/non-US and Telecom Operator/non-Telecom Operator devices</p>	“ ”		
	May 2, 2019	GOOG-PLAY-003604248	Victor Popa	S9 and Note9 amendment	<p>2. b) If Samsung removes all application icons from the Default Home Screen,</p> <p>Place the Folder on the first row of the application tray, which is one level away from the Default Home Screen</p> <p>Play Store icon must be placed in the device hotseat</p> <p>Specific placements based on US/non-US and Telecom Operator/non-Telecom Operator devices</p> <p>Placed in the Edge Panel: Duo, Chrome, Google Maps, YouTube</p>	“ ”		

**Appendix D****Summary of Google's Mobile Application Distribution Agreements with Large OEMs (excl. Europe)**

OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Through Dec. 31, 2020	GOOG-PLAY-003604279	Jamie Rosenberg					
	March 1, 2020 – Dec. 31, 2020	GOOG-PLAY-003604300	Luciane Moreto for Fionnuala Meehan					

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity

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OEM	Effective Dates	Source	Google Signatory	Compatibility Term	Pre-Install & Placement Requirements	GMS Apps	#GMS Apps	Preload Parity
	Aug. 4, 2020	GOOG-PLAY-003604514	Jamie Rosenberg					
	Aug. 3, 2020	GOOG-PLAY-003604365	Jamie Rosenberg					
	Dec. 23, 2020	GOOG-PLAY-003604517	Jamie Rosenberg					



## Appendix E

### Google Discount Programs

Program Name	Overview	Timeline	Eligibility	Terms	Rationale	Sources
Living Room Accelerator Program (LRAP)	Offers a reduced commission for developers of subscription video apps in exchange for using Google Play Billing and maintaining key living room integrations	2015 - present			To “(i) drive Play billing adoption, (ii) accelerate living room product integrations and (iii) align with M&E market terms ”	[1], [2], [3], [4], [5]
Living Room Accelerator Program++ (LRAP++)	Creates an additional revenue share tier for live TV providers offering live content catalog feed, ATC Live integrations, and CrOS optimization, in addition to existing LRAP requirements	2020 - present			15% commission was insufficient for certain sub-verticals, causing an “[i]ncreased risk of agitation if Google enforces policy with no commercially viable option for alignment, particularly in verticals that compete with IP services ”	[6], [3], [4]
Audio Distribution Accelerator Program (ADAP)	Offers a reduced commission for developers of subscription music and audio-focused apps, specifically those offering on-demand licensed content	2016 - present			To “[s]upport audio-streaming apps to grow their commercial subscriptions with Play,” “[e]xpand the reach of key, high-profile apps to more Android platforms,” and “[c]reate strong incentives to spur widespread adoption of Play In-App Billing (IAB) ”	[7], [8], [4]
Transactional Video Accelerator Program (TVAP)	Extends the LRAP into video on-demand	2021 - present			To address thin margins forcing the video on-demand segment “to go consumption only or get frustrated with LRAP limitations ”	[9], [4]
Books and Comics Accelerator Program (BCAP)	Offers a reduced commission for developers of book and comics apps “It includes e-books, audiobooks, and e-book comics ”	2021 - present			To “address books vertical margin challenges as it pertains to content costs ”	[10], [4]
Subscribe with Google (SwG)	Serves as a “platform that enables both publishers and Google to understand when a user has a news subscription and make sure that sites and products respond accordingly ” It offers a reduced in-app commission and a higher web purchase commission SwG is a part of the Google News Initiative	2020 - present			To prevent subscribing from being a “frustrating experience” for users, which could result in loss of business for publishers, by simplifying the subscription experience and help publishers maintain engagement	[11], [4], [12]
App Velocity Program (AVP)	Offers cloud credits, ad credits, promotions, and points to “partners with sizeable Google business” in exchange for the exclusive use of Google Play Billing, product integration, and parity	2021 - present			To “deepen partnership and improve sentiment around Play value proposition,” “[b]oost x-PA value delivered” and to [b]oost integration with Play Billing,” by offering “early commercial incentives as [developers] co-invest in xPA simultaneously ”	[8], [13], [4]
Games Velocity Program (GVP) aka Project Hug	Offers cloud credits, ad credits, promotions, and points to partners in the Gaming vertical “Play re-invests margin to drive partner business growth on Play and encourage partners to lean into Google across - GCP, UAC, YT ”	2018 - present			To “[e]nsure major game titles launch on Play,” “[e]ase Play revenue share agitation,” and [d]eepen x-Google relationships ”	[14], [15], [4], [16]

Audio Distribution Accelerator Program++ (ADAP++)	Creates an additional revenue share tier for music and audio-focused app developers offering additional product integration in addition to existing ADAP requirements		[17]
Surface Accelerator	Offers cloud and ad credits to developers that are important to multiple Google surfaces		[18]
Mobile Accelerator	Offers cloud and ad credits to developers of Android mobile-only apps with large user bases and strong monetization		[18]
Trusted Partner Program	Offers cloud and ad credits to “[b]ig developers with global-scale subscription platforms that are great payment partners ”		[19]

**Individual Offers**

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**Commission Changes**

	Google lowered its commission for subscriptions, applicable only “for users retained after 12 months ”	2018 - 2021	Developers offering in-app subscriptions Reduced fee applies for users retained after 12 months of subscription	30% commission for the first year of subscription; 15% commission for users retained after a year of subscription	[23]
	For automatically renewing subscription products purchased by subscribers, the commission is 15%	2022 - present	Subscription services	15% commission for automatically renewing subscription products	[24], [25]
Project Runway	Google lowered its commission for developers' first \$1 million of earnings they make each year for the sale of digital goods and services For earnings above \$1 million, the standard commission applies	2021 - present	Developers must have “a payments profile,” “create an Account Group,” and “accept the Terms of Service for the 15% service fee tier ”	15% commission for first \$1 million in earnings; 30% commission for earnings in excess of \$1 million	To help small and medium businesses going through difficult times as a result of the COVID-19 pandemic and to compete with Apple's Small Business Program which offerend similar terms [26], [27]

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3. Google, "LRAP++: Program Details and Outreach Process," July 20, 2020, GOOG-PLAY-003330554-558, at 554-555.
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5. Email from Shannon Newberry, Google, to Jamie Rosenberg, Vice President of strategy for platforms and ecosystems at Google, Claire Hart, Google, "Subject: Re: Pls Read: App store email," June 8, 2016, GOOG-PLAY-000081809-811, at 811.
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18. Google, "Accelerator Programs 2020," July 2019, GOOG-PLAY-003331764-819, at 776-777.
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22. Google, "[REDACTED]" June 10, 2022, GOOG-PLAY-011250116-166.
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25. Google, "Service fees," 2022, available at [https://support.google.com/googleplay/android-developer/answer/112622?hl=en&visit\\_id=637872098045257136-3276584470&rd=1](https://support.google.com/googleplay/android-developer/answer/112622?hl=en&visit_id=637872098045257136-3276584470&rd=1).
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## Appendix F Technical Appendix

### I. Damages Model with Entry and Variety Effects

1. I develop a model of competition between apps in which developers supply apps and in-app content and compete on prices charged to consumers. My model is based on a classic model in the literature on indirect network effects: Church and Gandal (1993). The model generates formulae for estimating damages as a result of direct effects of changes in but-for commission or Play Points on app and in-app content prices as well as damages as a result of effects of changes in but-for commission or Play Points on the number of apps entering the markets. In addition, the model is used to estimate consumer choice (*i.e.*, number of available apps) and output effects of Google’s anticompetitive conduct.

2. I consider a model with three periods. In period 1, a countably infinite number of identical firms simultaneously choose whether or not to enter. Firms that enter pay a fixed cost  $F$ . In period 2, firms that enter are indexed by  $i = 1, \dots, n$ . Firms choose the price of their product  $p_i$ . In period 3, a representative consumer chooses how much to buy of each product. I search for a subgame perfect Nash equilibrium.

3. I find the equilibrium by backward induction.

#### A. Consumers

4. Google Play Store has  $n$  apps. A representative consumer chooses the quantity of transactions  $q_i$ , at each app  $i = 1, \dots, n$ .<sup>1</sup> Let  $\vec{q}$  be the  $n \times 1$  vector of elements  $q_i$ . The utility function for the consumer is:

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<sup>1</sup> An alternative to assuming that there is a single representative consumer that buys every app is to use a discrete choice model, that is, to assume there are a set of heterogeneous consumers that buy one app (or several apps). Representative agent and discrete models are closely related and have the same implications for many outcomes of interest. Intuitively, if we observe product-level quantity data (as opposed to individual level purchase data), we cannot distinguish just from data whether every consumer bought some of each product or different consumers bought each product. Thus, either modeling approach to such data can typically be mapped into the other approach. Anderson et al (1989) show how to map a CES model, such as used here, into a logit discrete choice model. (Anderson, Simon P., André De Palma, and Jacques-François Thisse, “Demand for Differentiated Products, Discrete Choice Models, and the Characteristics Approach,” *The Review of Economic Studies*, Vol. 56, Issue 1, 1989, pp. 21-35 (“Anderson et al (1989)”))

$$u(\vec{q}) = \left( \sum_{i=1}^n (a_i q_i)^{\frac{1}{\rho}} \right)^{\rho}$$

where  $\rho > 1$  represents the degree of substitutability between transactions on different apps. The greater is  $\rho$ , the greater is the preference for variety.<sup>2</sup> The parameters  $a_i$  reflect the relative quality of each app. This utility function is a standard model in economics and underlies many classic models of competition, such as Dixit and Stiglitz (1977).<sup>3</sup>

5. The price of app  $i$  per transaction is  $p_i$ . Google Play also provides Play Points and other direct discounts to consumers on that posted price which is denoted by  $t_B$ . The final price paid by a consumer on a transaction is then  $p_i(1 - t_B)$ . The consumer has a budget  $y$  to spend on apps so the budget constraint is:

$$\sum_{i=1}^n p_i q_i = \frac{y}{1 - t_B}$$

6. The consumer chooses the quantity of transactions from each app subject to the budget constraint. Mathematically, the problem for the consumer is:

$$\max_{q_1, \dots, q_n} u(\vec{q}) \text{ s.t. } \sum_{i=1}^n p_i q_i = \frac{y}{1 - t_B}$$

This leads to the demand system for each app  $i$ :

$$q_i(\vec{p}, \bar{p}) = \frac{y}{1 - t_B} \times \frac{(a_i \bar{p})^{\frac{1}{\rho-1}}}{p_i^{\frac{\rho}{\rho-1}}}$$

E. 1

where:

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<sup>2</sup> Let  $\sigma$  be own price elasticity of demand. Then, the relationship between  $\rho$  and  $\sigma$  is  $\rho = \frac{\sigma}{\sigma-1}$ .

<sup>3</sup> Dixit, Avinash K. and Joseph E. Stiglitz, "Monopolistic Competition and Optimum Product Diversity," *The American Economic Review*, Vol. 67, No. 3, 1977, pp. 297-308 (hereafter "Dixit and Stiglitz (1977)"). Note that Dixit and Stiglitz (1977) analyze a general version of the CES utility function that allows for two nests. I use a special case of the utility function for my analyses.

$$\bar{p} = \left( \sum_{i=1}^n \left[ \frac{p_i}{a_i} \right]^{\frac{-1}{\rho-1}} \right)^{1-\rho}$$

That is,  $\bar{p}$  can be seen as a price index adjusted for the number of varieties that depends on app quality and the consumer's preference for variety. The more app choices, the better are the apps, and the more the consumer prefers variety, the lower is the effective price index.

7. Taking logs of both sides of the demand equation gives us an equation that is linear in parameters. I run a log-log regression of quantity of transactions on prices net of developer discounts to estimate the parameter  $\frac{\rho}{\rho-1}$ , which is the own-price elasticity. In that regression, I demean the data to account for app fixed effects, include time fixed effects, purchase type fixed effects, and use a measure of the sales tax rate to instrument for price as motivated by Zoutman et al. (2018).<sup>4</sup> The motivation for the instrument is that tax rates can serve as a source of exogenous variation in prices for consumers: “a standard assumption in models of taxation since Ramsay (1927) is that the supply of a good depends on the before-tax price, whereas demand depends on the price after taxation.”<sup>5</sup> The results are summarized in Exhibit 71 in the report.

## B. Firms

8. A firm producing (supplying) app  $i$  faces fixed cost  $F$  of developing the app and marginal cost  $c$  per transaction. A firm also does not know the actual quality of its app at the time of making the decision of whether to incur the fixed cost of developing the app and setting a price.<sup>6</sup> Its expected profit function is:

$$\pi_i(\vec{p}) = (1 - \tau)p_i E(q_i) - cE(q_i) - F$$

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<sup>4</sup> Zoutman, Floris T., Evelina Gavrilova, and Arnt O. Hopland, “Estimating Both Supply and Demand Elasticities Using Variation in a Single Tax Rate,” *Econometrica*, Vol. 86(2), 2018, pp. 763-771 (hereafter “Zoutman et al. (2018)”). See also Dearing, Adam, “Estimating structural demand and supply models using tax rates as Instruments,” *Journal of Public Economics*, Vol. 205, 2022.

<sup>5</sup> Zoutman et al. (2018), p. 764.

<sup>6</sup> See Janßen, Rebecca, Reinhold Kesler, Michael E. Kummer, and Joel Waldfogel, “GDPR and the Lost Generation of Innovative Apps,” *NBER Working Paper Series*, 2022 (hereafter “Janßen et al (2022)”), p. 22 (finding “strong evidence that app success is unpredictable.”).



9. Where  $\tau$  is the commission charged by the Google Play Store and  $E$  is the expectation operator. I assume that all developers are ex-ante symmetric and hence have the same beliefs about potential app quality.<sup>7</sup> Plugging in from E. 1 we have:

$$\pi_i(\vec{p}) = \frac{((1 - \tau)p_i - c)yE \left[ (a_i \bar{p})^{\frac{1}{\rho-1}} \right]}{(1 - t_B)p_i^{\frac{\rho}{\rho-1}}} - F$$

10. Each firm maximizes profit with respect to price  $p_i$  simultaneously in a Nash equilibrium. Firms account for the direct effect of  $p_i$  and the effect on the price index  $\bar{p}$ . The first order condition for app  $i$  is then:

$$(1 - \tau)E \left[ (a_i \bar{p})^{\frac{1}{\rho-1}} \right] + [(1 - \tau)p_i - c] \times \left[ \frac{E \left[ (a_i \bar{p})^{\frac{2}{\rho-1}} \right]}{(\rho - 1)p_i^{\frac{\rho}{\rho-1}}} - \frac{\rho E \left[ (a_i \bar{p})^{\frac{1}{\rho-1}} \right]}{(\rho - 1)p_i} \right] = 0$$

11. Under the symmetric Nash equilibrium, we have  $p_i = p^* \forall i$ . Substituting into the first order condition:

$$(\rho - 1)(1 - \tau)E \left[ \frac{a_i^{\frac{1}{\rho-1}}}{\sum_{j=1}^n a_j^{\frac{1}{\rho-1}}} \right] + \left[ (1 - \tau) - \frac{c}{p} \right] \times \left[ E \left[ \left( \frac{a_i^{\frac{1}{\rho-1}}}{\sum_{j=1}^n a_j^{\frac{1}{\rho-1}}} \right)^2 \right] - \rho E \left[ \frac{a_i^{\frac{1}{\rho-1}}}{\sum_{j=1}^n a_j^{\frac{1}{\rho-1}}} \right] \right] = 0$$

12. Let  $a_i = 1 \forall i$ . Using this in the first order conditions and rearranging gives the symmetric Nash equilibrium price:<sup>8</sup>

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<sup>7</sup> This assumption is without loss of generality with respect to the optimal pricing of apps. If the number of apps is large enough, then apps do not consider the effect of their individual prices on price index (as that effect goes to zero as the number of apps becomes large). In such a case, even if apps know exactly about their quality before setting the prices, one can show that in equilibrium, the optimal price is  $p^* = \frac{\rho c_i}{1 - \tau}$ , where  $c_i$  is marginal cost of app  $i$ . That is, prices do not depend on quality.

<sup>8</sup> An assumption to get to this simple formula is that all firms have marginal cost  $c$ . One way to think about this assumption is to consider apps that have imperfect knowledge about their marginal costs ex-ante. This is possible, for example, because developers face costs of user acquisition—marketing costs—on a per-user acquired basis, but

$$p^*(n, \tau) = \frac{(\rho n - 1)c}{(n - 1)(1 - \tau)}$$

E. 2

13. Let  $\pi^*(n, \tau)$  be the equilibrium profit when there are  $n$  firms conditional on the commission. Under free entry, the equilibrium number of firms  $n^*(\tau)$  is such that  $\pi^*(n^*(\tau), \tau) = 0$  (ignoring integer constraints on  $n$ ). We have:

$$\pi^*(n, \tau) = \left[ (1 - \tau) - \frac{c}{p^*(n, \tau)} \right] \times \frac{y}{(1 - t_B)n} - F$$

E. 3

14. The optimal profits decline in both  $n$  and  $\tau$  and increase in  $t_B$ .

15. Substituting for  $p^*(n, \tau)$  in E. 3, I can solve for  $n^*(\tau)$ :

$$n^*(\tau) = \frac{1 + \frac{y(1 - \tau)(\rho - 1)}{(1 - t_B)F}}{\rho}$$

E. 4

16. Given an estimate of  $\rho$ , E. 2 and E. 4 can be used to calibrate  $F$  and  $c$ .

### C. Welfare Effects of $\tau$ and $t_B$

17. I calculate (1) the direct effect of the commission and Google's price discount on price (overcharge); (2) the welfare effect from increased app varieties, while shutting down the price effects (*i.e.* prices remain at the initial level); (3) total welfare effect of commission and Google's price discount.

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predicting ex ante the amount of advertising cost necessary is difficult because the cost of advertising depends on app success. That is, each app sets price based on an average marginal cost that equals to  $c$ . In that case, an interpretation of the marginal cost in my model is that it is an average marginal cost. Alternatively, if  $n$  is large enough, then apps do not consider the effect of their individual prices on the price index (as that effect goes to zero as  $n$  becomes large). If apps know their individual marginal costs exactly in such a case, equilibrium implies  $p^* = \frac{\rho c_i}{1 - \tau}$  where  $c_i$  is marginal cost of app  $i$ . If the average of  $c_i$  is equal to  $c$  in my model, then my model approximates the average price set by apps.

*1. Direct Effect on Price*

18. The direct effect on price refers to the effect of Google's conduct (through the commission and direct price discounts to consumers it has chosen) on prices holding fixed the number of apps. Let  $\tau_1$  denote the initial, actual, commission and  $\tau_2$  the new, but-for, commission. Also, let  $t_{B_1}$  denote the initial direct price discount rate and  $t_{B_2}$  the but-for price discount rate. Then the percentage overcharge due to direct effect of commission and Play Points on price is:

$$\begin{aligned} ((1 - t_{B_2})p_2^* - (1 - t_{B_1})p_1^*) / ((1 - t_{B_1})p_1^*) &= \frac{\frac{(1 - t_{B_2})(\rho n - 1)c}{(n - 1)(1 - \tau_2)} - \frac{(1 - t_{B_1})(\rho n - 1)c}{(n - 1)(1 - \tau_1)}}{\frac{(1 - t_{B_1})(\rho n - 1)c}{(n - 1)(1 - \tau_1)}} \\ &= \frac{(1 - \tau_1)(1 - t_{B_2}) - (1 - \tau_2)(1 - t_{B_1})}{(1 - \tau_2)(1 - t_{B_1})} \end{aligned}$$

E. 5

19. This equation can be used to calculate damages due to the direct effect of commission and Play Points on price. Exhibit I.1 in Appendix I provides the following six versions of overcharge damages by Plaintiff State and year:<sup>9</sup>

- Pooled markets with but-for commission and Play Points;
- Pooled markets with only but-for commission effects (i.e.  $t_{B_2}$  is set to equal  $t_{B_1}$ );
- Pooled markets with only Play Points effect (i.e.,  $\tau_2$  is set to equal  $\tau_1$ );
- Android In-App Billing Services Market with but-for commission and Play Points;
- Android In-App Billing Services Market with only but-for commission effects (i.e.  $t_{B_2}$  is set to equal  $t_{B_1}$ ); and
- Android In-App Billing Services Market with only Play Points effect (i.e.,  $\tau_2$  is set to equal  $\tau_1$ ).

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<sup>9</sup> Appendix J contains a similar exhibit with yearly damages for all states and U.S. administrative areas in the data.

20. I calculate a common overcharge over August 16, 2016- May 31, 2022. As described in Section VII of my report, the but-for commission is set to be 15% for the pooled markets damages and is common across all years and states. As further described in Section VIII of my report, the but-for commission is set to be 15% percent for the In-App Billing Services market damages in the scenario in which Google has a legitimate monopoly in the Android App-Distribution Market but engages in anticompetitive tying. To calculate the but-for Google price discount, I (i) calculate the price discount due to Play Points over January 1, 2020-May 31, 2022 by dividing the dollar value of total Play Points (assuming 100 Play Points equals \$1) by the gross consumer expenditure net of developer discounts; (ii) multiply this by the gross consumer expenditure net of developer discounts over August 16, 2016-December 31, 2019; and (iii) add this amount to the actual Google discounts over August 16, 2016-May 31, 2022 and divide that by the gross consumer expenditure net of developer discounts over August 16, 2016-May 31, 2022.

21. To allocate the overcharge damages to the Plaintiff States during the relevant period (at the annual level), I use the respective net consumer expenditure in each Plaintiff State/year. I drop missing state names in the Google Transaction Data starting from August 1, 2016.<sup>10</sup>

22. I extrapolate damages up through the scheduled trial start date of June 5, 2023. To do so, I use data from January 1, 2018-May 31, 2022 to estimate a time trend by running a regression of net consumer spend on a constant and time trend which I use to predict the values in each month from June 2022 to June 5, 2023, accounting for the number of days in the partial month. Consequently, I allocate net consumer spend proportionally by state according to the percent distribution of net spend over states for the years 2018 through 2019.

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<sup>10</sup> Letter from Brian C. Rocca to Brendan Benedict, “Re: In re Google Play Store Antitrust Litigation, No. 3:21-md-02981-JD (N.D. Cal.); In re Google Play Consumer Antitrust Litigation, No. 3:20-cv-05761-JD (N.D. Cal.); Epic Games, Inc. v. Google LLC et al., No. 3:20-cv-05671-JD (N.D. Cal.); State of Utah, et al. v. Google LLC et al., No. 3:21-cv-05227-JD (N.D. Cal.); Match Group, LLC et al. v. Google LLC et al., Case No. 3:22-cv-02746-JD,” August 23, 2022, p. 1 (“Google has sampled a number of transactions where the ‘state’ information is missing and confirms that for the period August 2016 to July 2021, these are test purchases for which ‘state’ information is not required.”).

23. Finally, I use the annual shares of phones and tablets from Google Monthly App Revenue Data<sup>11</sup> to restrict damages to consumer spend on phone and tablet devices.<sup>12</sup>

## 2. *Welfare Effect Through Increased Variety*

24. Here, I set but-for price to its initial level,  $p_1^*$ , *i.e.* the price does not respond either directly or indirectly to  $\tau$ . Even if developers do not lower app and in-app content prices, they would still earn greater revenues, and hence higher profits, under a lower but-for  $\tau$  or higher  $t_B$ . This further incentivizes more firms to enter and launch more apps and in-app content on the platform. Consumers are better off because they intrinsically value the variety of apps available on the platform. I calculate the change in consumer welfare due to increased variety and then convert the welfare change to dollars.

25. Using the consumer's utility function and demand system, the consumers' indirect utility is calculated as:

$$V(p, n) = \frac{y}{(1 - t_B)} \times \frac{n^{\rho-1}}{p}$$

26. I ask what is the equivalent amount of dollars, denoted by  $\Delta y$ , that one should give a consumer to make her as happy as if the commission was  $\tau_2$  instead of  $\tau_1$  and the discount was  $t_{B2}$  instead of  $t_{B1}$  (*i.e.*, I do not decrease  $\tau_1$  to  $\tau_2$  and do not increase  $t_{B1}$  to  $t_{B2}$  but instead give the consumer compensation that makes her as well off). This translates into solving the following for  $\Delta y$ :

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<sup>11</sup> To extrapolate the share for January 1, 2022, to June 5, 2023, I take the compound annual growth rate of this share from 2019 to 2021 and project the share in subsequent years. I also treat missing device types in the Google's monthly app revenue data as part of phones and tablets.

<sup>12</sup> Note that Google in its correspondence regarding the Google Transaction Data stated that "We understand 'device\_class' may not be tracked accurately by Google and are investigating the burden of providing this information." See Letter from Brian C. Rocca to Gregory Arenson, "Re: In re Google Play Store Antitrust Litigation, No. 3:21-md-02981-JD (N.D. Cal.); Epic Games, Inc. v. Google LLC et al., No. 3:20-cv-05671-JD (N.D. Cal.); In re Google Play Consumer Antitrust Litigation, No. 3:20-cv-05761-JD (N.D. Cal.); In re Google Play Developer Antitrust Litigation, No. 3:20-cv-05792-JD (N.D. Cal.); State of Utah, et al. v. Google LLC et al., No. 3:21-cv-05227-JD (N.D. Cal.)," October 11, 2021, p. 12. Thus, I use 'device\_type' field from the Google Monthly App Revenue Data to account for the device type in the damages calculations.

$$\frac{(y + \Delta y)}{(1 - t_{B_1})} \times \frac{n_1^{\rho-1}}{p_1^*} = \frac{y}{(1 - t_{B_1})} \times \frac{n_2^{\rho-1}}{p_1^*}$$

27. The solution is:

$$\Delta y = y \times \left[ \frac{n_2^{\rho-1}}{n_1^{\rho-1}} - 1 \right]$$

E. 6

28. The actual number of apps  $n_1$  is observed in the data. To derive  $n_2$ , I use the following version of E. 3 as a free entry condition:

$$\left[ (1 - \tau_2) - \frac{c}{p_1^*} \right] \times \frac{y}{(1 - t_{B_2})n_2} - F = 0$$

29. This profit is obtained by fixing  $p^* = p_1^*$ ; allowing for higher revenues per unit of quantity under  $\tau_2$ , which is  $(1 - \tau_2)p_1^*$ ; and using consumer demand that is evaluated at  $p_1^*$  but allows for higher discount and more varieties *i.e.*, the price index aggregates across  $n_2$  varieties with each product having price  $p_1^*$ .

30. The free entry condition gives:

$$n_2 = \frac{y}{(1 - t_{B_2})F} \times \frac{((1 - \tau_2)p_1^* - c)}{p_1^*}$$

E. 7

31. Provided that we have estimates of marginal and fixed costs, we can recover  $n_2$  and plug into E. 6 to calculate  $\Delta y$ .

32. Using E. 3,  $n_1$  can be expressed as:

$$n_1 = \frac{y}{(1 - t_{B_1})F} \times \frac{((1 - \tau_1)p_1^* - c)}{p_1^*}$$

E. 8

33. Dividing E. 7 by E. 8, we have:

$$\frac{n_2}{n_1} = \frac{((1 - \tau_2)p_1^* - c)(1 - t_{B_1})}{((1 - \tau_1)p_1^* - c)(1 - t_{B_2})}$$

34. Substituting for  $p_1^*$  in the above expression gives:



$$\frac{n_2}{n_1} = \frac{(\rho y(1 - \tau_2) - y(1 - \tau_1) + (1 - t_{B_1})F)(1 - t_{B_1})}{((\rho - 1)y(1 - \tau_1) + (1 - t_{B_1})F) \frac{(1 - t_{B_1})}{(1 - t_{B_2})}}$$

35. Substituting the latter into E. 6, we obtain:

$$\Delta y = y \times \left( \left[ \frac{(\rho y(1 - \tau_2) - y(1 - \tau_1) + (1 - t_{B_1})F)(1 - t_{B_1})}{((\rho - 1)y(1 - \tau_1) + (1 - t_{B_1})F) \frac{(1 - t_{B_1})}{(1 - t_{B_2})}} \right]^{\rho-1} - 1 \right)$$

E. 9

36. This equation is used to calculate damages as a result of forgone varieties under the assumption that prices do not decrease in the but-for world. Exhibit I.2 in Appendix I provides the following six versions of damages by Plaintiff State and year due to welfare effect through increased variety:<sup>13</sup>

- Pooled markets with but-for commission and Play Points;
- Pooled markets with only but-for commission effects (i.e.  $t_{B_2}$  is set to equal  $t_{B_1}$ );
- Pooled markets with only Play Points effect (i.e.  $\tau_2$  is set to equal  $\tau_1$ );
- Android In-App Billing Services Market with but-for commission and Play Points;
- Android In-App Billing Services Market with only but-for commission effects (i.e.  $t_{B_2}$  is set to equal  $t_{B_1}$ );
- Android In-App Billing Services Market with only Play Points effect (i.e.  $\tau_2$  is set to equal  $\tau_1$ ).

37. Similar to how I calculate the direct price effect, I calculate a common multiplicative factor equal to the expression inside the parenthesis of equation E. 9. I calibrate the own-price elasticity using the estimate from Ghose and Han (2014). I calibrate the fixed cost,  $F$ , using equation E. 4 evaluated at the actual world values. To allocate the damages to the Plaintiff States during the relevant period (at the annual level), I use respective net consumer spend in each Plaintiff State/year.

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<sup>13</sup> Appendix J contains a similar exhibit with yearly damages for all states and U.S. administrative areas in the data.

#### D. Total Welfare Effect

38. The total welfare effect (in \$) due to a lower commission and higher Play Points in the but-for world is represented as:

$$\Delta y = y \times \left[ \frac{p_1(1 - t_{B_1}) n_2^{\rho-1}}{p_2(1 - t_{B_2}) n_1^{\rho-1}} - 1 \right]$$

39. For an illustration, this can be decomposed as follows:

$$\begin{aligned} \Delta y &= y \times \left[ \frac{p_1(1 - t_{B_1}) n_2^{\rho-1}}{p_2(1 - t_{B_2}) n_1^{\rho-1}} - 1 \right] \geq y \times \left[ \frac{p_1(1 - t_{B_1})}{p_2(1 - t_{B_2})} - 1 \right] + y \times \left[ \frac{n_2^{\rho-1}}{n_1^{\rho-1}} - 1 \right] \\ &= Q_2 p_2 (1 - t_{B_2}) \times \left[ \frac{p_1(1 - t_{B_1})}{p_2(1 - t_{B_2})} - 1 \right] + y \times \left[ \frac{n_2^{\rho-1}}{n_1^{\rho-1}} - 1 \right] \\ &\geq Q_1 p_2 (1 - t_{B_2}) \times \left[ \frac{p_1(1 - t_{B_1})}{p_2(1 - t_{B_2})} - 1 \right] + y \times \left[ \frac{n_2^{\rho-1}}{n_1^{\rho-1}} - 1 \right] \\ &= Q_1 [(1 - t_{B_1}) p_1 - (1 - t_{B_2}) p_2] + y \times \left[ \frac{n_2^{\rho-1}}{n_1^{\rho-1}} - 1 \right] \end{aligned}$$

40. The first inequality follows from observing that  $\frac{p_1(1-t_{B_1})}{p_2(1-t_{B_2})} \geq 1$  and  $\frac{n_2^{\rho-1}}{n_1^{\rho-1}} \geq 1$ . The second inequality follows from observing that  $Q_2 \geq Q_1$  where capital  $Q$  denotes total number of transactions. This illustrates that the total welfare loss for consumers is at least as large as the damages from the direct effect on price estimated in the previous section.<sup>14</sup>

41. I substitute the equilibrium expressions for  $p_1, p_2, n_1$ , and  $n_2$  in the expression for the total welfare change and arrive at the following equation which is used to calculate the total damages:

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<sup>14</sup> I underestimate the damages from the direct effect on price using the method in Section C.1 for two reasons: (1) as illustrated by the last inequality in the equation above, the total harm to consumer welfare should be evaluated incorporating the output effects (*i.e.*, at  $Q_2$ ), and (2) when estimating the damages from the direct effect on price, I do not use  $p_2$ , the but-for price, but instead use the higher but-for price assuming there was no change in the number of firms.

$$\Delta y = y \times \left[ \left( \frac{(y(1 - \tau_2) - (1 - t_{B_2})F)(1 - t_{B_1})}{(y(1 - \tau_1) - (1 - t_{B_1})F)(1 - t_{B_2})} \right) \times \left( \frac{(y(1 - \tau_2)(\rho - 1) + (1 - t_{B_2})F)(1 - t_{B_1})}{(y(1 - \tau_1)(\rho - 1) + (1 - t_{B_1})F)(1 - t_{B_2})} \right)^{\rho-1} - 1 \right]$$

E. 10

42. Exhibit I.3 in Appendix I provides the following six versions of total damages by Plaintiff State and year:<sup>15</sup>

- Pooled markets with but-for commission and Play Points;
- Pooled markets with only but-for commission effects (i.e.  $t_{B_2}$  is set to equal  $t_{B_1}$ );
- Pooled markets with only Play Points effect (i.e.  $\tau_2$  is set to equal  $\tau_1$ );
- Android In-App Billing Services Market with but-for commission and Play Points;
- Android In-App Billing Services Market with only but-for commission effects (i.e.  $t_{B_2}$  is set to equal  $t_{B_1}$ );
- Android In-App Billing Services Market with only Play Points effect (i.e.  $\tau_2$  is set to equal  $\tau_1$ ).

**E. Consumer Choice and Output Effects of Google's Anticompetitive Conduct**

43. To calculate a percentage increase in the number of apps in the but-for world, I use the following expression:

$$\frac{n_2}{n_1} - 1 = \frac{(y(1 - \tau_2)(\rho - 1) + (1 - t_{B_2})F)(1 - t_{B_1})}{(y(1 - \tau_1)(\rho - 1) + (1 - t_{B_1})F)(1 - t_{B_2})} - 1$$

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<sup>15</sup> Appendix J contains a similar exhibit with yearly damages for all states and U.S. administrative areas in the data.

E. 11

44. To estimate the output effects in each year, I use the symmetric Nash Equilibrium condition,  $p_i = p^* \forall i$ , in E. 1 and sum up the output to get the total output across all apps (denoted by  $Q$ ). I arrive at:

$$Q = \frac{y}{(1 - t_B)p^*}$$

E. 12

45. Consequently, conservatively assuming that there is only a direct effect of commission on price, I use E. 2 in the expression above and arrive at:

$$Q_2 = Q_1 \frac{(1 - \tau_2)(1 - t_{B1})}{(1 - \tau_1)(1 - t_{B2})}$$

E. 13

## II. Model Adaptation for SSNIP Calculation

46. I can also adapt the model described above to investigate whether a hypothetical monopolist of both Android In-app Billing Services and Android App Distribution would find it profitable to impose a SSNIP of 10%. That is, the question is whether the markets are no broader than Android In-app Billing Services and App Distribution. These adjustments are set out in the sections below.

### A. SSNIP Model

47. I start with the hypothetical monopolist's profit function at the competitive price, which is written as:

$$\Pi = ((\tau^* - t_B^*) \times p^*(\tau^*, t_B^*) - C) \times Q^*(\tau^*, t_B^*)$$

48. Where the price  $p^*$  is the price of app/in-app content,  $Q^*$  is the number of transactions (downloads and in-app purchases),  $\tau^*$  is the competitive commission paid by apps per sale which is 15% for transactions corresponding to either download or in-app purchase,  $t_B^*$  is the competitive price discount to consumers, and  $C$  is the hypothetical monopolist's marginal cost. Hence,  $p^*(\tau^*, t_B^*) \times Q^*(\tau^*, t_B^*)$  is the total expenditure on app and in-app content and  $(\tau^* - t_B^*) \times p^*(\tau^*, t_B^*) \times Q^*(\tau^*, t_B^*)$  is the hypothetical monopolist's revenue. In what follows, I will

use a shorthand to write price and quantity of transactions without explicitly indicating that they are functions of commission or other parameters of the model.

49. The hypothetical monopolist imposes SSNIP on both the competitive commission and the competitive price discount. Therefore, a 10% SSNIP on  $\tau^*$  and a 10% SSNIP on price discount would be profitable for a hypothetical monopolist if:

$$((1.1\tau^* - 0.9t_B^*)p^{**} - C)Q^{**} > ((\tau^* - t_B^*)p^* - C)Q^*$$

50. Where  $p^{**}$  and  $Q^{**}$  denote the price of app/in-app content and the number of transactions after the hypothetical monopolist has imposed a 10% SSNIP, respectively. Let  $Q^{**} = Q^* - \Delta Q^*$ , that is  $Q^{**}$  can be decomposed into the initial competitive but-for number of transactions minus the reduction in the transactions due to higher prices and commission. Using this decomposition in the expression above and rearranging gives:

$$C \geq \frac{\frac{\Delta Q^*}{Q^*} (1.1\tau^* - 0.9t_B^*)p^{**} - (1.1\tau^* - 0.9t_B^*)p^{**} + (\tau^* - t_B^*)p^*}{\frac{\Delta Q^*}{Q^*}} \quad \text{E. 14}$$

51. The right-hand side of equation E. 14 is a threshold such that if the hypothetical monopolist's marginal cost is larger than the threshold then the SSNIP is profitable and hence the markets are no broader than App Distribution and In-App Billing Services on Android.

52. Finally, dividing the numerator and denominator of the right-hand side of E. 14 by the percentage change in price, I obtain the following expression:

$$C \geq \frac{\epsilon_{Q,p} (1.1\tau^* - 0.9t_B^*)p^{**} - \frac{[(1.1\tau^* - 0.9t_B^*)p^{**} - (\tau^* - t_B^*)p^*]p^*}{p^{**} - p^*}}{\epsilon_{Q,p}} \quad \text{E. 15}$$

53. Where  $\epsilon_{Q,p}$  denotes the negative of the percentage change in total equilibrium quantity on the markets as a result of SSNIP divided by the percentage change in price as a result of SSNIP.

54. The right-hand side of E. 15 is the critical marginal cost threshold that I estimate.<sup>16</sup> If the hypothetical monopolist's marginal cost is larger than that critical threshold, then the SSNIP is profitable, and the markets are no broader than App Distribution and In-App Billing Services on Android.

### **B. Adapted App Competition Model**

55. In my damages model, a consumer has a fixed budget to allocate across content; that is,  $y$  is constant in the model. This implies that  $y$  will not change if a hypothetical monopolist increases commission or decreases discount. To allow for the potential changes in the budget in response to the changes in commission or Play Points, I extend the damages model to a nested utility CES model with an outside good.<sup>17</sup> This type of model potentially allows  $\epsilon_{Q,p}$  to be more than 1.<sup>18</sup> This approach would be conservative for the SSNIP analysis if it generates  $\epsilon_{Q,p} > 1$ . Under higher  $\epsilon_{Q,p}$ , a SSNIP would become less profitable for a hypothetical monopolist.<sup>19</sup>

56. In what follows, I solve a model which has a potential to provide a more conservative framework for the SSNIP analysis. The model is used to obtain  $\epsilon_{Q,p}$  and prices that feed into the equation E. 15.

57. I consider a model with three periods. In period 1, a countably infinite number of identical firms simultaneously choose whether or not to enter. Firms that enter pay a fixed cost  $F$ . In period 2, firms that enter are indexed by  $i = 1, \dots, n$ . Firms choose the price of their

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<sup>16</sup> The formula in E.15 of this appendix that provides the critical marginal cost threshold does not depend on the specific model of competition or method of calibration explained below and that I have used in this report. I reserve the right in future reports, as I review the record further, to use an alternative model, calibration method, or rate response.

<sup>17</sup> See Dixit and Stiglitz (1977). Note that Dixit and Stiglitz (1977) analyze a general version of the CES utility function with two nests. I use a special case of the utility function for my analyses.

<sup>18</sup> Note that the fixed budget implies that this  $\epsilon_{Q,p}$  is 1 in the damages model. See equation 12.

<sup>19</sup> Note that in the hypothetical competitive but-for world, the market share of the hypothetical monopolist would also be higher because it would serve not only the Google's actual world market share but also the portion outside the Google's market share in the actual world. However, note that if I scale up the quantity and revenue of the hypothetical monopolist in the same way, then this results in scaling up the hypothetical monopolist's profit function and does not affect the SSNIP analysis.



product  $p_i$ . In period 3, a representative consumer chooses how much to buy of each product. I search for a subgame perfect Nash equilibrium.

58. I find the equilibrium by backward induction.

1. **Consumer**

59. Starting in the final period, the representative consumer chooses how much to purchase of each product  $i$ , denoted by  $q_i$ . The  $n$  vector of quantities is denoted  $\vec{q}$ . In addition, the consumer may purchase an outside good  $z$ . Prices are  $p_i$ , with  $p_z$  normalized to  $p_z = 1$ . The consumer has a nested CES utility function:

$$u(\vec{q}, z) = \left( \left( \sum_{i=1}^n (q_i)^{\frac{1}{\rho}} \right)^{\frac{\rho}{\alpha}} + z^{\frac{1}{\alpha}} \right)^{\alpha}$$

where  $\rho > 1$  represents the degree of substitutability between transactions on different apps, and  $\alpha > 1$  represents the degree of substitutability between the outside good and the *composite app good* (defined below).

60. The hypothetical monopolist provides Play Points and other direct discounts to consumers on that posted price which is denoted by  $t_B$ . The final price paid by a consumer on a transaction is then  $p_i(1 - t_B)$ . The consumer has the income  $m$  to spend on apps and the outside good so the budget constraint is:

$$\sum_{i=1}^n p_i q_i + \frac{z}{1 - t_B} = \frac{m}{1 - t_B}$$

61. The consumer chooses the quantity of transactions from each app and the quantity of outside good subject to the budget constraint. The consumer's optimal choices can be found by maximizing the Lagrangian formula:

$$\max_{q_1, \dots, q_n, z} u(\vec{q}, z) + \lambda \left( \frac{m}{1 - t_B} - \sum_{i=1}^n p_i q_i - \frac{z}{1 - t_B} \right)$$

The first order condition with respect to  $q_i$  is:

$$\alpha \left( \left( \sum_{i=1}^n (q_i)^{\frac{1}{\rho}} \right)^{\frac{\rho}{\alpha}} + z^{\frac{1}{\alpha}} \right)^{\alpha-1} \frac{\rho}{\alpha} \left( \sum_{i=1}^n (q_i)^{\frac{1}{\rho}} \right)^{\frac{\rho-\alpha}{\alpha}} \frac{1}{\rho} q_i^{\frac{1-\rho}{\rho}} - \lambda p_i = 0$$

For any two products  $i$  and  $j$ , this implies:

$$\left( \frac{q_i}{q_j} \right)^{\frac{1-\rho}{\rho}} = \frac{p_i}{p_j}$$

Thus, every product is consumed according to the proportion:

$$q_j = q_i \left( \frac{p_i}{p_j} \right)^{\frac{\rho}{\rho-1}}$$

E. 16

62. We can think of the consumer as making a single choice of how many units of a *composite app good* to buy and then determining how much of each app to buy based on that. Let the composite app good be:

$$\bar{Q} = \left( \sum_{i=1}^n (q_i)^{\frac{1}{\rho}} \right)^{\rho}$$

63. I show that the total expenditure on apps  $y = \sum_{i=1}^n p_i q_i$  is equal to  $\bar{p} \bar{Q}$  where  $\bar{p}$  is the price index defined as:

$$\bar{p} = \left( \sum_{i=1}^n p_i^{\frac{-1}{\rho-1}} \right)^{1-\rho}$$

64. Thus, we can interpret the price index as the price of a unit of the composite good. To see this, plug in from E. 16 to  $\bar{Q}$ :

$$\bar{Q} = \left( \sum_{j=1}^n \left( q_i \left( \frac{p_i}{p_j} \right)^{\frac{\rho}{\rho-1}} \right)^{\frac{1}{\rho}} \right)^{\rho} = q_i p_i^{\frac{\rho}{\rho-1}} \left( \sum_{j=1}^n p_j^{\frac{-1}{\rho-1}} \right)^{\rho}$$

Thus:

$$q_i = \bar{Q} p_i^{\frac{-\rho}{\rho-1}} \left( \sum_{j=1}^n p_j^{\frac{-1}{\rho-1}} \right)^{-\rho}$$

E. 17

Multiplying each side by  $p_i$ :

$$p_i q_i = \bar{Q} p_i^{\frac{-1}{\rho-1}} \left( \sum_{j=1}^n p_j^{\frac{-1}{\rho-1}} \right)^{-\rho}$$

Summing over  $i$ , we have:

$$\sum_{i=1}^n p_i q_i = y = \bar{Q} \sum_{i=1}^n p_i^{\frac{-1}{\rho-1}} \left( \sum_{j=1}^n p_j^{\frac{-1}{\rho-1}} \right)^{-\rho} = \bar{p} \bar{Q}$$

Thus, we can rewrite the budget constraint as:

$$\bar{p} \bar{Q} + \frac{z}{1 - t_B} = \frac{m}{1 - t_B}$$

Given the budget constraint and the optimal choices of ap/in-app quantity ratios, the consumer chooses the quantities of composite good and outside good. The Lagrangian for this problem can be written as:

$$\max_{\bar{Q}, z} \left( \bar{Q}^{\frac{1}{\alpha}} + z^{\frac{1}{\alpha}} \right)^{\alpha} + \lambda \left( \frac{m}{1 - t_B} - \bar{p} \bar{Q} - \frac{z}{1 - t_B} \right)$$

The first order conditions are:

$$\alpha \left( \bar{Q}^{\frac{1}{\alpha}} + z^{\frac{1}{\alpha}} \right)^{\alpha-1} \frac{1}{\alpha} \bar{Q}^{\frac{1}{\alpha}-1} = \lambda \bar{p}$$

$$\alpha \left( \bar{Q}^{\frac{1}{\alpha}} + z^{\frac{1}{\alpha}} \right)^{\alpha-1} \frac{1}{\alpha} z^{\frac{1}{\alpha}-1} = \frac{\lambda}{1 - t_B}$$

Thus:

$$\left( \frac{\bar{Q}}{z} \right)^{\frac{1}{\alpha}-1} = \bar{p}(1 - t_B) \Rightarrow z = (\bar{p}(1 - t_B))^{\frac{\alpha}{\alpha-1}} \bar{Q}$$

Plugging into the budget constraint and rewriting:

$$z = \frac{m(\bar{p}(1 - t_B))^{\frac{\alpha}{\alpha-1}}}{(\bar{p}(1 - t_B))^{\frac{\alpha}{\alpha-1}} + \bar{p}(1 - t_B)}$$

$$\bar{Q} = \frac{m}{(\bar{p}(1 - t_B))^{\frac{\alpha}{\alpha-1}} + \bar{p}(1 - t_B)}$$

E. 18

65. It follows that the negative of the elasticity of composite good with respect to the price index is:

$$\epsilon_{\bar{Q}, \bar{p}} = \left[ \frac{\frac{\alpha}{\alpha-1} (\bar{p}(1 - t_B))^{\frac{\alpha}{\alpha-1}} + \bar{p}(1 - t_B)}{(\bar{p}(1 - t_B))^{\frac{\alpha}{\alpha-1}} + \bar{p}(1 - t_B)} \right]$$

66. We can plug in  $\bar{Q}$  to E. 17 to get the demand for each app:

$$q_i = \frac{m}{p_i^{\frac{\rho}{\rho-1}} \left[ \bar{p}^{\frac{1}{1-\rho}} (1 - t_B) + \bar{p}^{\frac{\alpha-\rho}{(1-\rho)(\alpha-1)}} (1 - t_B)^{\frac{\alpha}{\alpha-1}} \right]}$$

E. 19

## 2. *Firms*

67. A firm producing app  $i$  faces fixed cost  $F$  of developing the app and marginal cost  $c$  per transaction. Its profit function is:

$$\pi_i(\vec{p}) = (1 - \tau)p_i q_i - c q_i - F$$

68. Where  $\tau$  is the commission charged by the hypothetical monopolist, sometimes referred to as the commission. Plugging in from E. 19 we have:

$$\pi_i(\vec{p}) = \frac{((1 - \tau)p_i - c)m}{p_i^{\frac{\rho}{\rho-1}} \left[ \bar{p}^{\frac{1}{1-\rho}} (1 - t_B) + \bar{p}^{\frac{\alpha-\rho}{(1-\rho)(\alpha-1)}} (1 - t_B)^{\frac{\alpha}{\alpha-1}} \right]} - F$$

69. Each firm maximizes profit with respect to price  $p_i$  simultaneously in a Nash equilibrium. Firms account for the direct effect of  $p_i$ . Here, I assume that the firms do not take into account the effect of their individual prices on the price index  $\bar{p}$ . Note that this assumption is valid for markets where we see large number of products (firms). In such a case, the effect of

individual firm's price on the price index becomes negligible. The first order condition for app  $i$  is then:

$$(1 - \tau)p_i^{\frac{\rho}{\rho-1}} - \frac{\rho}{\rho-1}p_i^{\frac{1}{\rho-1}}[(1 - \tau)p_i - c] = 0$$

70. Under the symmetric Nash equilibrium, we have  $p_i = p^* \forall i$ . Substituting into the first order condition and rewriting, the symmetric Nash equilibrium price is:

$$p^* = \frac{\rho c}{(1 - \tau)}$$

E. 20

71. Let  $\pi^*(n, \tau)$  be the equilibrium profit when there are  $n$  firms conditional on the commission (note that equilibrium profit is also a function of other parameters of the model but for the ease of notation I don't write it here). Under free entry, the equilibrium number of firms  $n^*(\tau)$  is such that  $\pi^*(n^*(\tau), \tau) = 0$  (ignoring integer constraints on  $n$ ). We have:

$$\pi^*(n, \tau) = \frac{((1 - \tau)p^* - c)m}{p^{\frac{\rho}{\rho-1}} \left[ \bar{p}^{\frac{1}{1-\rho}}(1 - t_B) + \bar{p}^{\frac{\alpha-\rho}{(1-\rho)(\alpha-1)}}(1 - t_B)^{\frac{\alpha}{\alpha-1}} \right]} - F$$

Note that in the equilibrium the price index is:

$$\bar{p} = p^* n^{1-\rho}$$

72. Substituting in the expression for equilibrium profit, we have:

$$\pi^*(n, \tau) = \frac{((1 - \tau)p^* - c)m}{p^{\frac{\rho}{\rho-1}} \left[ p^{*\frac{1}{1-\rho}} n(1 - t_B) + p^{*\frac{\alpha-\rho}{(1-\rho)(\alpha-1)}} n^{\frac{\alpha-\rho}{\alpha-1}} (1 - t_B)^{\frac{\alpha}{\alpha-1}} \right]} - F$$

73. Substituting for  $p^*$  from E. 20 and equating to zero,  $n^*$  is solved from the following equation:

$$\frac{(\rho - 1)c}{\frac{n^* \rho c (1 - t_B)}{(1 - \tau)} + n^{*\frac{\alpha-\rho}{\alpha-1}} \left[ \frac{\rho c (1 - t_B)}{(1 - \tau)} \right]^{\frac{\alpha}{\alpha-1}}} = F/m$$

E. 21

### 3. Calibration

74. As shown above, the negative of the elasticity of the composite good with respect to the price index is:

$$\epsilon_{\bar{Q}, \bar{p}} = \left[ \frac{\frac{\alpha}{\alpha-1} (\bar{p}(1-t_B))^{\frac{\alpha}{\alpha-1}} + \bar{p}(1-t_B)}{(\bar{p}(1-t_B))^{\frac{\alpha}{\alpha-1}} + \bar{p}(1-t_B)} \right]$$

E. 22

75. In order to conduct the SSNIP calculation, I need an estimate of parameter  $\alpha$ , which governs the degree of substitutability between the outside good and the composite app good. To estimate  $\alpha$ , first I estimate  $\epsilon_{\bar{Q}, \bar{p}}$ , the elasticity of the composite app quantity with respect to the price index. In order to estimate this elasticity, I need an exogenous shifter of supply. Following Janßen et al (2022), I use the General Data Protection Regulation (GDPR) event as an exogenous supply shifter. GDPR, enacted by the EU in May 2018, imposes a series of rules intended to increase consumer security and privacy.<sup>20</sup> Janßen et al (2022) highlight that these rules affected the cost of developing and operating an app.<sup>21</sup> In order to use the GDPR event to calculate the elasticity, I look at the percentage change in the composite app good from one year before GDPR to one year after GDPR and divide by the percentage price index change from one year before GDPR to one year after GDPR.<sup>22</sup> To calculate the indices for one year before and one year after GDPR, I use the same estimate of  $\rho$  that was used in calculating damages, calculate  $q$  as the average number of transactions in the data used for the damages calculation over the same period as is used to calculate  $p$ , and plug them into the formula for the equilibrium price index:  $\bar{p} = pn^{1-\rho}$  and composite good:  $\bar{Q} = qn^\rho$ . I also adjust the after-GDPR values for the composite good using the compounded growth rate over three years before GDPR.

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<sup>20</sup>Proton Technologies AG, “FAQ,” available at <https://gdpr.eu/faq/>; *See also*, Janßen et al (2022), p. 1.

<sup>21</sup> Janßen et al (2022), p.4.

<sup>22</sup> This follows the idea of calculating the local average treatment effect famously explained in, Imbens, Guido W. and Joshua D. Angrist, “Identification and Estimation of Local Average Treatment Effects,” *Econometrica*, Vol. 62, No. 2, 1994, pp. 467-475.



This gives me an estimate of elasticity of composite app quantity with respect to the price index,  $\epsilon_{\bar{Q}, \bar{p}}$ , of 11.35.<sup>23</sup> Consequently, I use this estimate, the actual value of price index (calculated using the data used for the damages calculation from August 16, 2016-May 2022), and the actual value of the Google discount to calibrate  $\alpha$  from E. 22 which gives me an  $\alpha$  of 3.01.<sup>24</sup>

76. Consequently, I calculate  $\epsilon_{Q,p}$ . For that calculation, I need to calibrate equilibrium prices before and after SSNIP. Also, I need to calibrate equilibrium aggregate output (total number of transactions) before and after SSNIP.

77. Using the above expressions for the price index and the composite good in E. 18, we get that the total equilibrium quantity,  $Q^*$ , is:

$$Q^* = \frac{m}{p^*(1 - t_B) + n^{\frac{1-\rho}{\alpha-1}}(p^*(1 - t_B))^{\frac{\alpha}{\alpha-1}}} \quad \text{E. 23}$$

78. Given the estimates of  $\rho$  and  $\alpha$  E. 20 and E. 21, evaluated at the actual values, are used to calibrate  $F/m$  and  $c$ .

79. Given the estimates of  $\rho$ , the competitive but-for commission, the commission after SSNIP, and  $c$  I use E. 20 to get  $p^*$  and  $p^{**}$  for the SSNIP equation E. 15.

80. Given the estimates of  $\rho$ , the competitive but-for commission and Play Points, the commission and Play Points after SSNIP,  $F/m$ ,  $\alpha$ , and  $c$ , I use E. 21 to calculate  $n^*$ , and  $n^{**}$ .

81. Finally, to get  $\epsilon_{Q,p}$  for the SSNIP equation E. 15, I plug in the above estimates in E. 23 and calculate  $[(Q^* - Q^{**})/Q^*]/[(p^{**} - p^*)/p^*]$  where those quantities and prices are evaluated at the respective equilibrium values and parameters.

82. This process allows me to account for the extent that total spending on apps would reduce if a hypothetical monopolist raised price. Note that when I calculate welfare harm, I use the CES model described in Section I of Appendix F rather than the nested CES model

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<sup>23</sup> While the model of competition that I use, when evaluated at the observed levels of prices and apps, does not allow for the elasticity of the composite index to equal 11.35, I choose the value of alpha that provides the closest elasticity of the composite index possible in my model, which is about 1.1. *See* Rysman Workpapers.

<sup>24</sup> *See* Rysman Workpapers.

described in this section. For quantifying welfare harm, I assume that the elasticity of total quantity to price is negative one. Assuming unit elasticity rather than elastic demand is conservative for the welfare harm calculation because if I accounted for how total spending on Google Play Store would expand as Google moved from the observed commission structure to the competitive structure, harm would be higher. Furthermore, using a conservative total market elasticity reduces the concerns about crowding introduced in Akerberg and Rysman (2005).<sup>25</sup>

### C. Summary

83. In summary, for the purposes of SSNIP, I adapt my damages model to investigate whether a hypothetical monopolist of both Android In-App Billing Services and Android App Distribution would find it profitable to impose a SSNIP of 10%. That is, the question is whether the markets are no broader than Android Distribution and Android In-App Billing Services. The important adjustment to the model is to relax the fixed budget assumption. The results of my SSNIP calculations summarized in the report in Section V.C.5 demonstrate that a hypothetical monopolist of Android In-App Billing Services and Android App Distribution would find it profitable to impose a SSNIP of 10%.

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<sup>25</sup> Akerberg, Daniel A. and Marc Rysman, “Unobserved Product Differentiation in Discrete-Choice Models: Estimating Price Elasticities and Welfare Effects,” *The RAND Journal of Economics*, Vol. 36, No. 4, 2005, pp. 771-788.

## Appendix G

### PC App Store Commissions

App Store	Overview	Terms	Timeline of Terms	Sources
Chrome Web Store	Lets developers publish Hosted Apps, Chrome Apps, Chrome Extensions, and Themes —either free or paid—where Google Chrome users can easily find them	1) 5% commission if using Chrome Web Store API to charge for features or virtual goods 2) 30% commission for in-app payments for ARC (Android Runtime for Chrome) apps	2011 - present	[1]
Epic Games Store	A videogame store, which can be used to download games in PC and Mac The Epic Games Store has more than 650 games and apps	1) 12% commission for all games 2) 5% licensing fee waived for games using Epic's Unreal Engine	1) 2018 - present 2) 2018 - present	[2]
Microsoft Store	An "online marketplace for consumers to buy and download a variety of items," including hardware and digital content It is available as "an application on Windows operating systems (OSes) and as a web app" The Microsoft Store currently has more than 800,000 apps	1) 30% commission for Xbox console games 2) 5% commission for non-game and non-Xbox apps when users download an app through a direct URL 3) 12% commission for PC games 4) no commission for apps using a third party payment processor	1) - present 2) 2019 - present 3) 2021 - present 4) 2021 - present	[3]
Steam	A videogame store, which can be used to download games in Windows, MacOS, and Linux Steam offers about 50,000 games	1) 20% commission for every sale in excess of \$50 million 2) 25% commission for every sale between \$10 and \$50 million 3) 30% for all other sales	1) 2018 - present 2) 2018 - present 3) 2004 - present	[4]
Game Jolt Store (Desktop)	A videogame platform, which can be used to play games on PC, mobile, and console devices	0-10% commission set by the developer	present	[5]

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## Appendix H

### Alternative Android App Store Commissions

App Store	Overview	Terms	Timeline of Terms	Sources
ONE Store	A Korean Android app market, holding about 18.4% market share in the local app store market	1) 20% commission and 5% for developers with their own payment methods 2) 50% discount in commission for developers earning less than \$5 million in monthly transactions	1) 2018 - present 2) 2020 - 2021	[1]
Amazon Appstore	An Android app store for downloading games and mobile apps to supported devices, which include Android devices, Windows 11 devices with Windows Subsystems for Android installed, Fire tablets, Fire TV, and some Blackberry devices. Additionally, users "can also shop for apps on [their] PC or Mac and then install them on a supported device."	1) 30% commission for mobile apps and in-app products 2) 20% commission for movie and TV subscription products sold in mobile apps and 30% commission for non-movie and non-TV subscription products sold in mobile apps 3) The lower of 30% commission or 80% of the list price for PC software/games and in-app products 4) Small Business Accelerator Program: 20% commission for developers earning less than \$1 million in the previous calendar year. Additionally, developers will receive 10% of revenue in AWS promotional credits	1) - present 2) 2018 - present 3) 2018 - present 4) 2021 - present	[2]
Aptoide	An independent Android online marketplace for apps and games with "over 300 million users, 7 billion downloads and 1 million apps."	4-25% commission for in-app transactions	present	[3]
Galaxy Store	An "app store that comes bundled on Galaxy and Gear devices. The Galaxy Apps store is also a go-to source for perks and deals offered only to Galaxy and Gear users."	30% commission that can be negotiated with Samsung	present	[4]
Game Jolt Store (Mobile)	A video game platform, which can be used to play games on PC, mobile, and console devices	0-10% commission set by the developer	present	[5]

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- Game Jolt, "Marketplace," available at <https://gamejolt.com/marketplace>; and Game Jolt, "About," available at <https://gamejolt.com/about>.

**Appendix I****Damages Exhibits, for Consumers in Plaintiff States, by Year and State, August 16, 2016 – June 5, 2023 (in USD)****Exhibit I.1****Damages Due to Direct Effects on Prices for Consumers in the Plaintiff States, by Year and State, August 16, 2016 – June 5, 2023 (in USD)**

State	Year	Pooled Markets			In-App Billing Services Market		
		Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only	Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only
AK	2016						
AR	2016						
AZ	2016						
CA	2016						
CO	2016						
CT	2016						
DC	2016						
DE	2016						
FL	2016						
IA	2016						
ID	2016						
IN	2016						
KY	2016						
LA	2016						
MA	2016						
MD	2016						
MN	2016						
MO	2016						
MS	2016						
MT	2016						
NC	2016						
ND	2016						
NE	2016						
NH	2016						
NJ	2016						
NM	2016						
NV	2016						
NY	2016						
OK	2016						
OR	2016						
RI	2016						
SD	2016						
TN	2016						
TX	2016						
UT	2016						



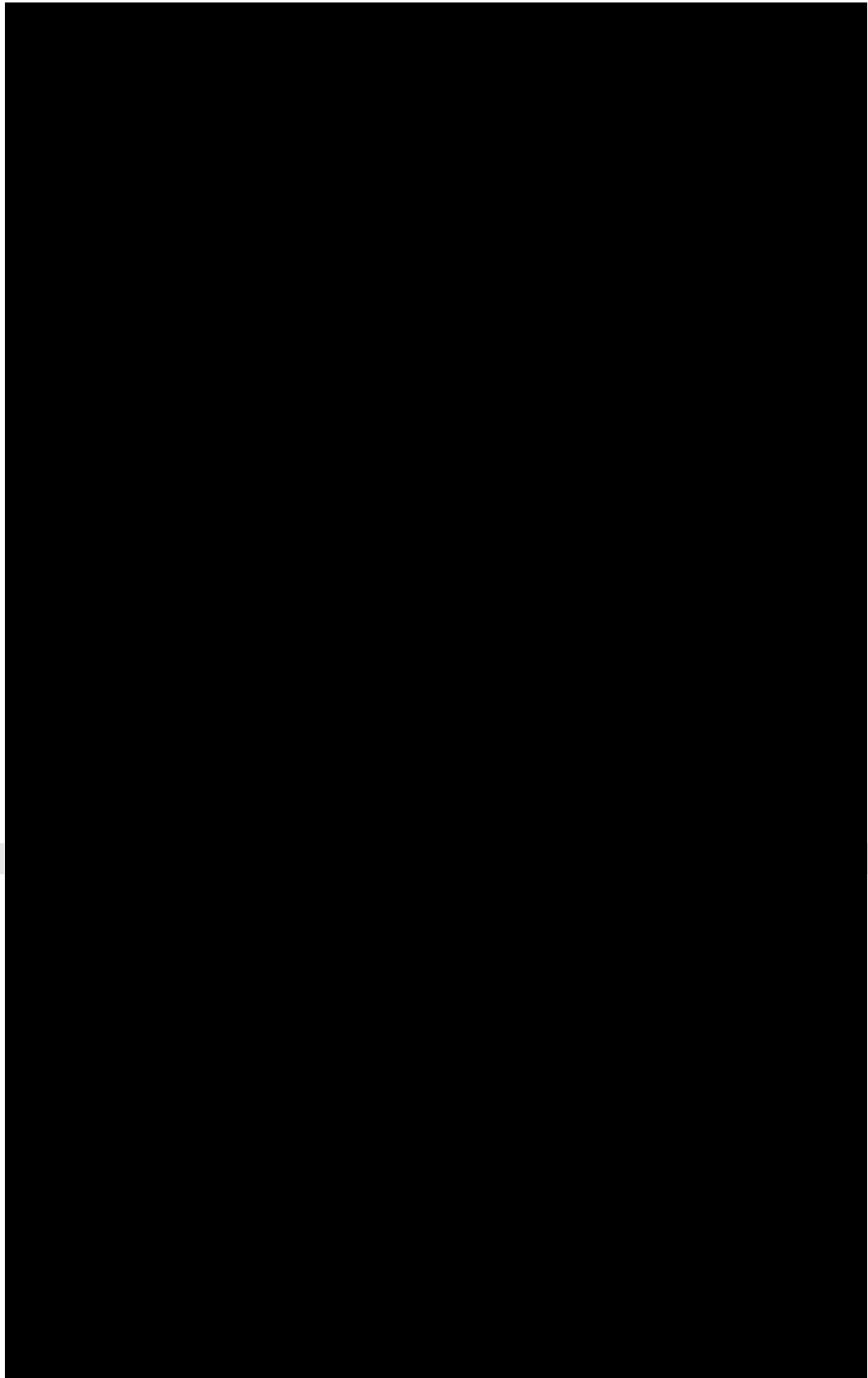
VA	2016	
VT	2016	
WA	2016	
WV	2016	
Total		
AK	2017	
AR	2017	
AZ	2017	
CA	2017	
CO	2017	
CT	2017	
DC	2017	
DE	2017	
FL	2017	
IA	2017	
ID	2017	
IN	2017	
KY	2017	
LA	2017	
MA	2017	
MD	2017	
MN	2017	
MO	2017	
MS	2017	
MT	2017	
NC	2017	
ND	2017	
NE	2017	
NH	2017	
NJ	2017	
NM	2017	
NV	2017	
NY	2017	
OK	2017	
OR	2017	
RI	2017	
SD	2017	
TN	2017	
TX	2017	
UT	2017	
VA	2017	
VT	2017	
WA	2017	
WV	2017	
Total		

AK	2018
AR	2018
AZ	2018
CA	2018
CO	2018
CT	2018
DC	2018
DE	2018
FL	2018
IA	2018
ID	2018
IN	2018
KY	2018
LA	2018
MA	2018
MD	2018
MN	2018
MO	2018
MS	2018
MT	2018
NC	2018
ND	2018
NE	2018
NH	2018
NJ	2018
NM	2018
NV	2018
NY	2018
OK	2018
OR	2018
RI	2018
SD	2018
TN	2018
TX	2018
UT	2018
VA	2018
VT	2018
WA	2018
WV	2018
Total	
AK	2019
AR	2019
AZ	2019
CA	2019

CO	2019
CT	2019
DC	2019
DE	2019
FL	2019
IA	2019
ID	2019
IN	2019
KY	2019
LA	2019
MA	2019
MD	2019
MN	2019
MO	2019
MS	2019
MT	2019
NC	2019
ND	2019
NE	2019
NH	2019
NJ	2019
NM	2019
NV	2019
NY	2019
OK	2019
OR	2019
RI	2019
SD	2019
TN	2019
TX	2019
UT	2019
VA	2019
VT	2019
WA	2019
WV	2019
<b>Total</b>	
AK	2020
AR	2020
AZ	2020
CA	2020
CO	2020
CT	2020
DC	2020
DE	2020

FL	2020
IA	2020
ID	2020
IN	2020
KY	2020
LA	2020
MA	2020
MD	2020
MN	2020
MO	2020
MS	2020
MT	2020
NC	2020
ND	2020
NE	2020
NH	2020
NJ	2020
NM	2020
NV	2020
NY	2020
OK	2020
OR	2020
RI	2020
SD	2020
TN	2020
TX	2020
UT	2020
VA	2020
VT	2020
WA	2020
WV	2020
Total	
AK	2021
AR	2021
AZ	2021
CA	2021
CO	2021
CT	2021
DC	2021
DE	2021
FL	2021
IA	2021
ID	2021
IN	2021

KY	2021
LA	2021
MA	2021
MD	2021
MN	2021
MO	2021
MS	2021
MT	2021
NC	2021
ND	2021
NE	2021
NH	2021
NJ	2021
NM	2021
NV	2021
NY	2021
OK	2021
OR	2021
RI	2021
SD	2021
TN	2021
TX	2021
UT	2021
VA	2021
VT	2021
WA	2021
WV	2021
<b>Total</b>	
AK	2022
AR	2022
AZ	2022
CA	2022
CO	2022
CT	2022
DC	2022
DE	2022
FL	2022
IA	2022
ID	2022
IN	2022
KY	2022
LA	2022
MA	2022
MD	2022



MN	2022
MO	2022
MS	2022
MT	2022
NC	2022
ND	2022
NE	2022
NH	2022
NJ	2022
NM	2022
NV	2022
NY	2022
OK	2022
OR	2022
RI	2022
SD	2022
TN	2022
TX	2022
UT	2022
VA	2022
VT	2022
WA	2022
WV	2022
<b>Total</b>	
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AR	2023
AZ	2023
CA	2023
CO	2023
CT	2023
DC	2023
DE	2023
FL	2023
IA	2023
ID	2023
IN	2023
KY	2023
LA	2023
MA	2023
MD	2023
MN	2023
MO	2023
MS	2023
MT	2023





NC	2023	
ND	2023	
NE	2023	
NH	2023	
NJ	2023	
NM	2023	
NV	2023	
NY	2023	
OK	2023	
OR	2023	
RI	2023	
SD	2023	
TN	2023	
TX	2023	
UT	2023	
VA	2023	
VT	2023	
WA	2023	
WV	2023	
<b>Total</b>		

*Notes:*

1. These figures utilize data for all states (excluding missing states) from August 16, 2016 through May 31, 2022 to calibrate my damages model.
2. To only account for the share of phones and tablets in damages, in allocating damages across state/years, I multiply net consumer spend by the share of net consumer spend for phones, tablets and missing device types for each year using the Google Monthly App Revenue Data.
3. I extrapolate net spend for June 1, 2022 through June 5, 2023 using a regression of net consumer spend on a time trend and a constant, using 2018-2022 data from the Google Transaction Data and the Google Monthly App Revenue Data. Consequently, I allocate net consumer spend proportionally by state according to the percent distribution of net spend over states for the years 2018 through 2022.

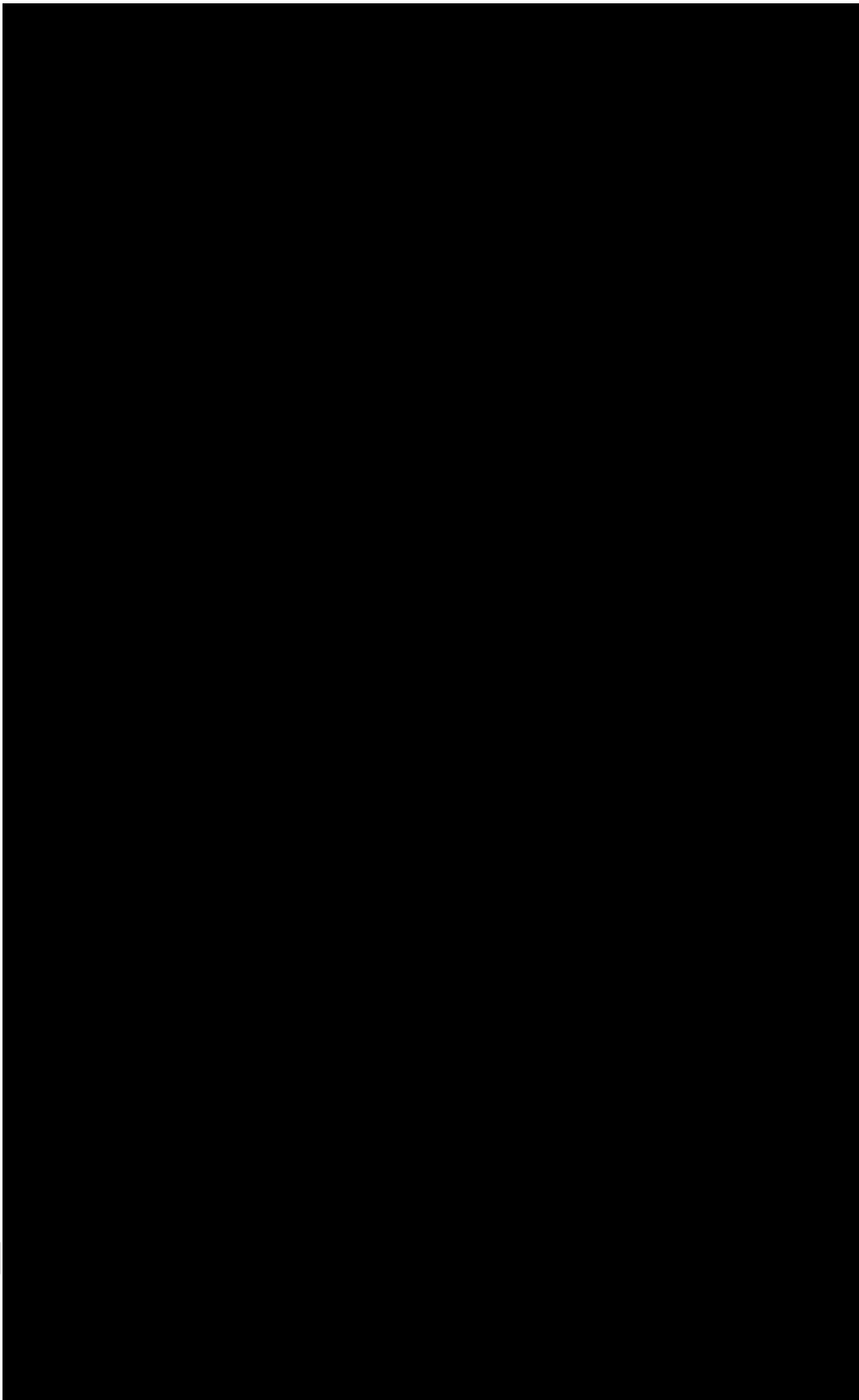
*Sources:*

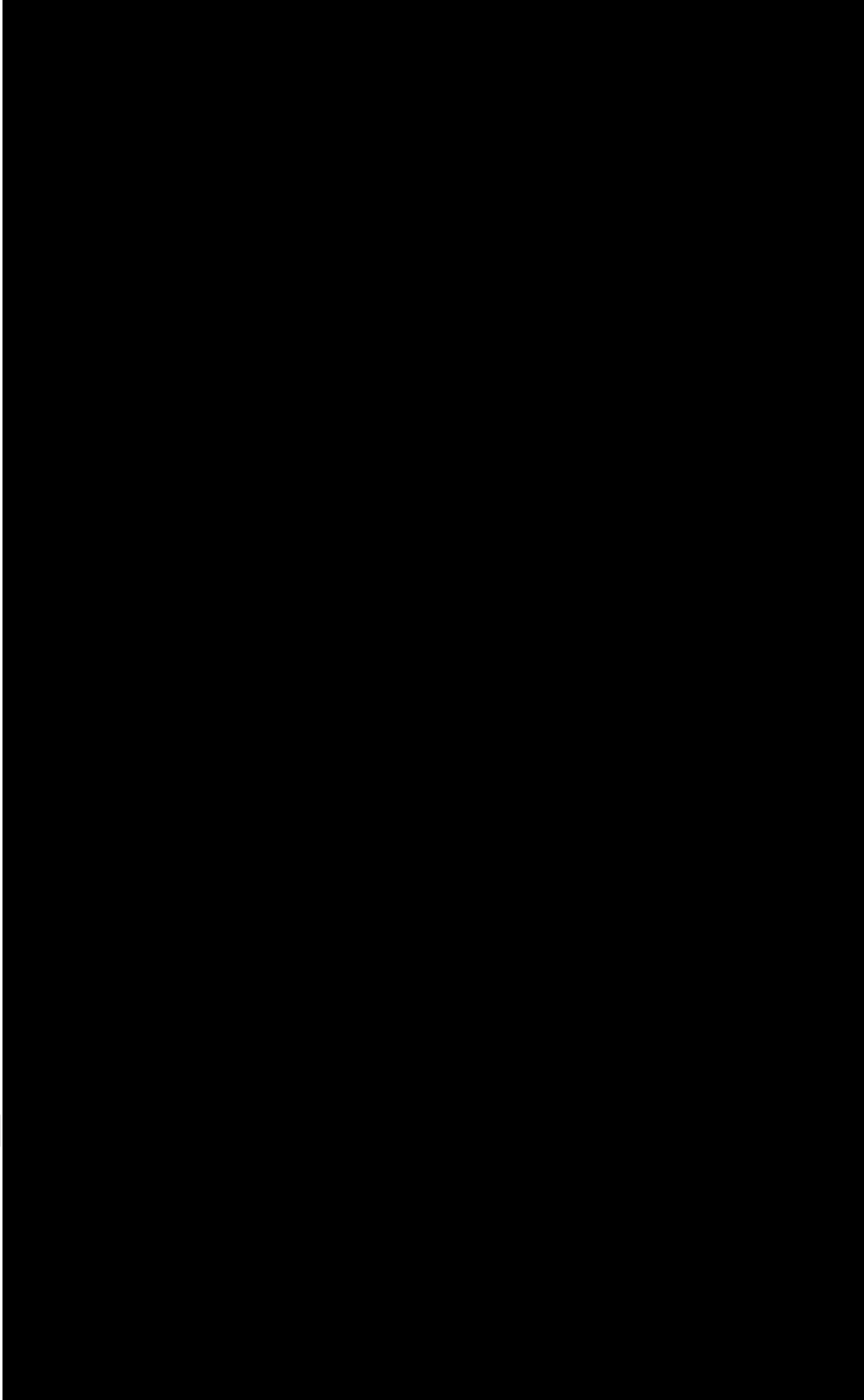
1. Google Transaction Data.
2. Google Monthly App Revenue Data.
3. Census State Code Crosswalk.

**Exhibit I.2**  
**Damages Due to Variety Effects for Consumers in the Plaintiff States,**  
**by Year and State, August 16, 2016 – June 5, 2023 (in USD)**

State	Year	Pooled Markets			In-App Billing Services Market		
		Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only	Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only
AK	2016						
AR	2016						
AZ	2016						
CA	2016						
CO	2016						
CT	2016						
DC	2016						
DE	2016						
FL	2016						
IA	2016						
ID	2016						
IN	2016						
KY	2016						
LA	2016						
MA	2016						
MD	2016						
MN	2016						
MO	2016						
MS	2016						
MT	2016						
NC	2016						
ND	2016						
NE	2016						
NH	2016						
NJ	2016						
NM	2016						
NV	2016						
NY	2016						
OK	2016						
OR	2016						
RI	2016						
SD	2016						
TN	2016						
TX	2016						
UT	2016						
VA	2016						

VT	2016
WA	2016
WV	2016
Total	
AK	2017
AR	2017
AZ	2017
CA	2017
CO	2017
CT	2017
DC	2017
DE	2017
FL	2017
IA	2017
ID	2017
IN	2017
KY	2017
LA	2017
MA	2017
MD	2017
MN	2017
MO	2017
MS	2017
MT	2017
NC	2017
ND	2017
NE	2017
NH	2017
NJ	2017
NM	2017
NV	2017
NY	2017
OK	2017
OR	2017
RI	2017
SD	2017
TN	2017
TX	2017
UT	2017
VA	2017
VT	2017
WA	2017
WV	2017
Total	

AK	2018	
AR	2018	
AZ	2018	
CA	2018	
CO	2018	
CT	2018	
DC	2018	
DE	2018	
FL	2018	
IA	2018	
ID	2018	
IN	2018	
KY	2018	
LA	2018	
MA	2018	
MD	2018	
MN	2018	
MO	2018	
MS	2018	
MT	2018	
NC	2018	
ND	2018	
NE	2018	
NH	2018	
NJ	2018	
NM	2018	
NV	2018	
NY	2018	
OK	2018	
OR	2018	
RI	2018	
SD	2018	
TN	2018	
TX	2018	
UT	2018	
VA	2018	
VT	2018	
WA	2018	
WV	2018	
Total		
AK	2019	
AR	2019	
AZ	2019	
CA	2019	

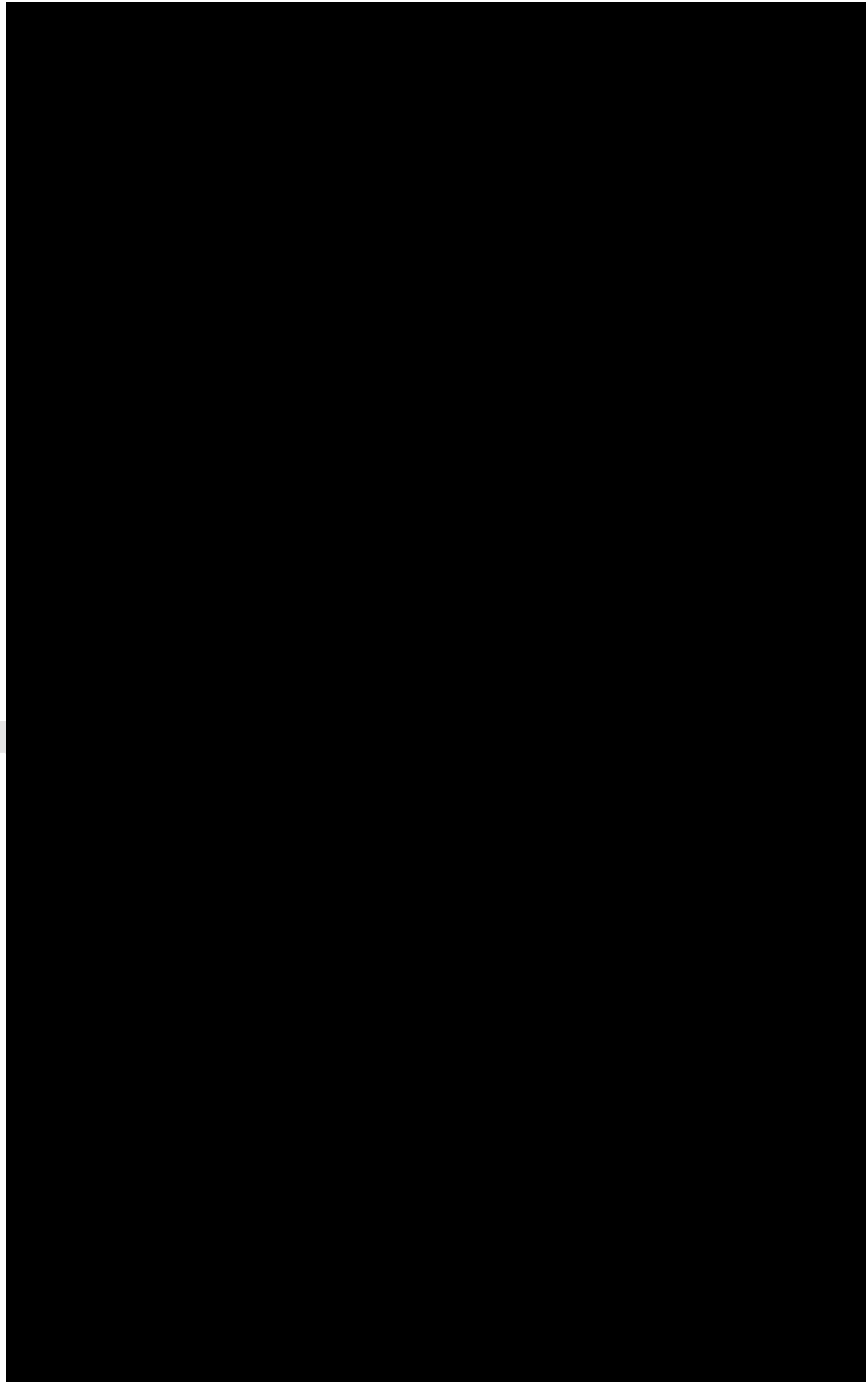
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CT	2019	
DC	2019	
DE	2019	
FL	2019	
IA	2019	
ID	2019	
IN	2019	
KY	2019	
LA	2019	
MA	2019	
MD	2019	
MN	2019	
MO	2019	
MS	2019	
MT	2019	
NC	2019	
ND	2019	
NE	2019	
NH	2019	
NJ	2019	
NM	2019	
NV	2019	
NY	2019	
OK	2019	
OR	2019	
RI	2019	
SD	2019	
TN	2019	
TX	2019	
UT	2019	
VA	2019	
VT	2019	
WA	2019	
WV	2019	
Total		
AK	2020	
AR	2020	
AZ	2020	
CA	2020	
CO	2020	
CT	2020	
DC	2020	
DE	2020	

FL	2020
IA	2020
ID	2020
IN	2020
KY	2020
LA	2020
MA	2020
MD	2020
MN	2020
MO	2020
MS	2020
MT	2020
NC	2020
ND	2020
NE	2020
NH	2020
NJ	2020
NM	2020
NV	2020
NY	2020
OK	2020
OR	2020
RI	2020
SD	2020
TN	2020
TX	2020
UT	2020
VA	2020
VT	2020
WA	2020
WV	2020
<b>Total</b>	
AK	2021
AR	2021
AZ	2021
CA	2021
CO	2021
CT	2021
DC	2021
DE	2021
FL	2021
IA	2021
ID	2021
IN	2021



KY	2021
LA	2021
MA	2021
MD	2021
MN	2021
MO	2021
MS	2021
MT	2021
NC	2021
ND	2021
NE	2021
NH	2021
NJ	2021
NM	2021
NV	2021
NY	2021
OK	2021
OR	2021
RI	2021
SD	2021
TN	2021
TX	2021
UT	2021
VA	2021
VT	2021
WA	2021
WV	2021
<b>Total</b>	
AK	2022
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AZ	2022
CA	2022
CO	2022
CT	2022
DC	2022
DE	2022
FL	2022
IA	2022
ID	2022
IN	2022
KY	2022
LA	2022
MA	2022
MD	2022

MN	2022
MO	2022
MS	2022
MT	2022
NC	2022
ND	2022
NE	2022
NH	2022
NJ	2022
NM	2022
NV	2022
NY	2022
OK	2022
OR	2022
RI	2022
SD	2022
TN	2022
TX	2022
UT	2022
VA	2022
VT	2022
WA	2022
WV	2022
<b>Total</b>	
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AZ	2023
CA	2023
CO	2023
CT	2023
DC	2023
DE	2023
FL	2023
IA	2023
ID	2023
IN	2023
KY	2023
LA	2023
MA	2023
MD	2023
MN	2023
MO	2023
MS	2023
MT	2023



NC	2023	
ND	2023	
NE	2023	
NH	2023	
NJ	2023	
NM	2023	
NV	2023	
NY	2023	
OK	2023	
OR	2023	
RI	2023	
SD	2023	
TN	2023	
TX	2023	
UT	2023	
VA	2023	
VT	2023	
WA	2023	
WV	2023	
Total		

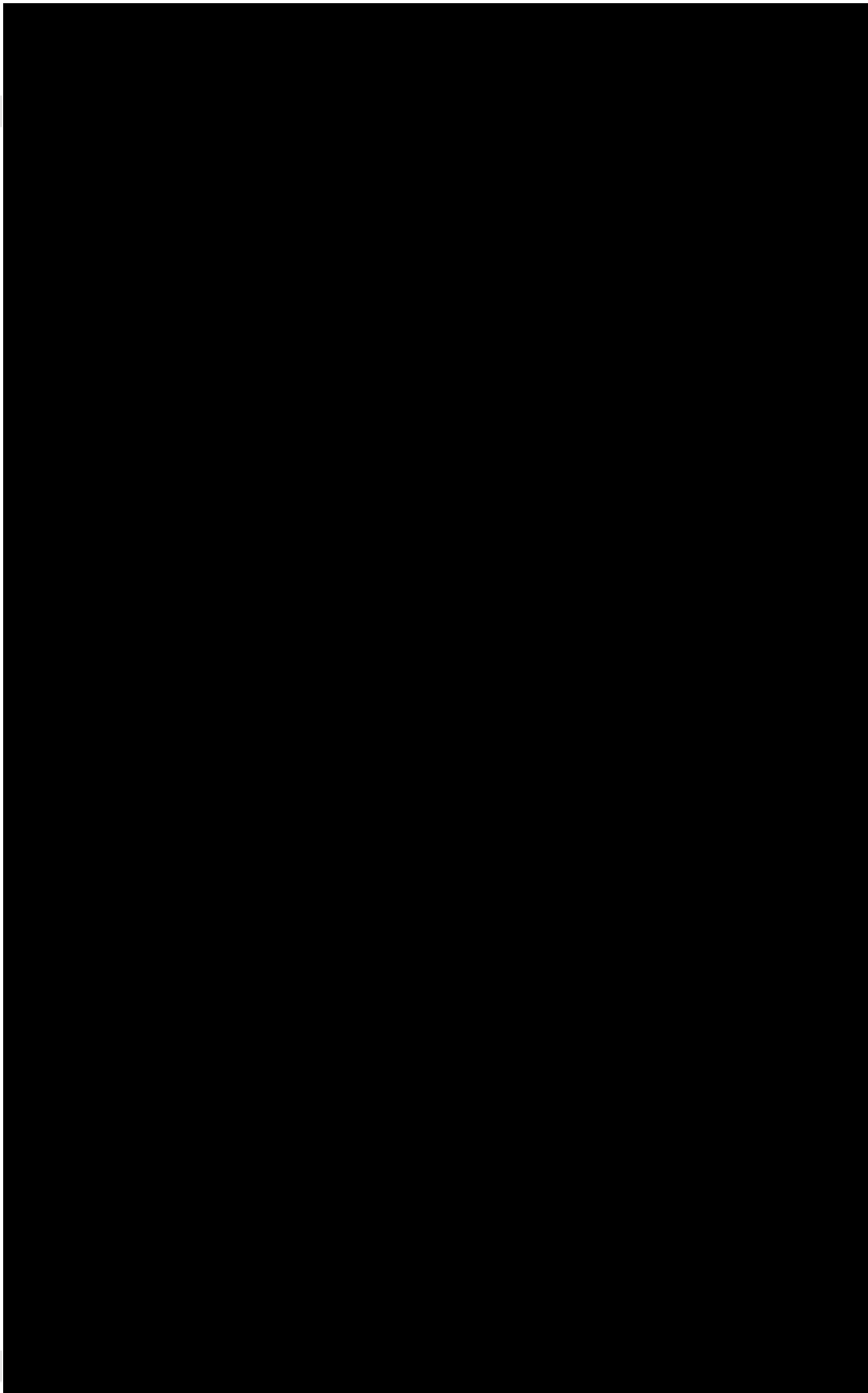
*Notes:* See notes in Exhibit I.1.

*Sources:* See sources in Exhibit I.1.

**Exhibit I.3**  
**Total Damages for Consumers in the Plaintiff States,**  
**by Year and State, August 16, 2016 – June 5, 2023 (in USD)**

State	Year	Pooled Markets			In-App Billing Services Market		
		Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only	Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only
AK	2016						
AR	2016						
AZ	2016						
CA	2016						
CO	2016						
CT	2016						
DC	2016						
DE	2016						
FL	2016						
IA	2016						
ID	2016						
IN	2016						
KY	2016						
LA	2016						
MA	2016						
MD	2016						
MN	2016						
MO	2016						
MS	2016						
MT	2016						
NC	2016						
ND	2016						
NE	2016						
NH	2016						
NJ	2016						
NM	2016						
NV	2016						
NY	2016						
OK	2016						
OR	2016						
RI	2016						
SD	2016						
TN	2016						
TX	2016						
UT	2016						
VA	2016						

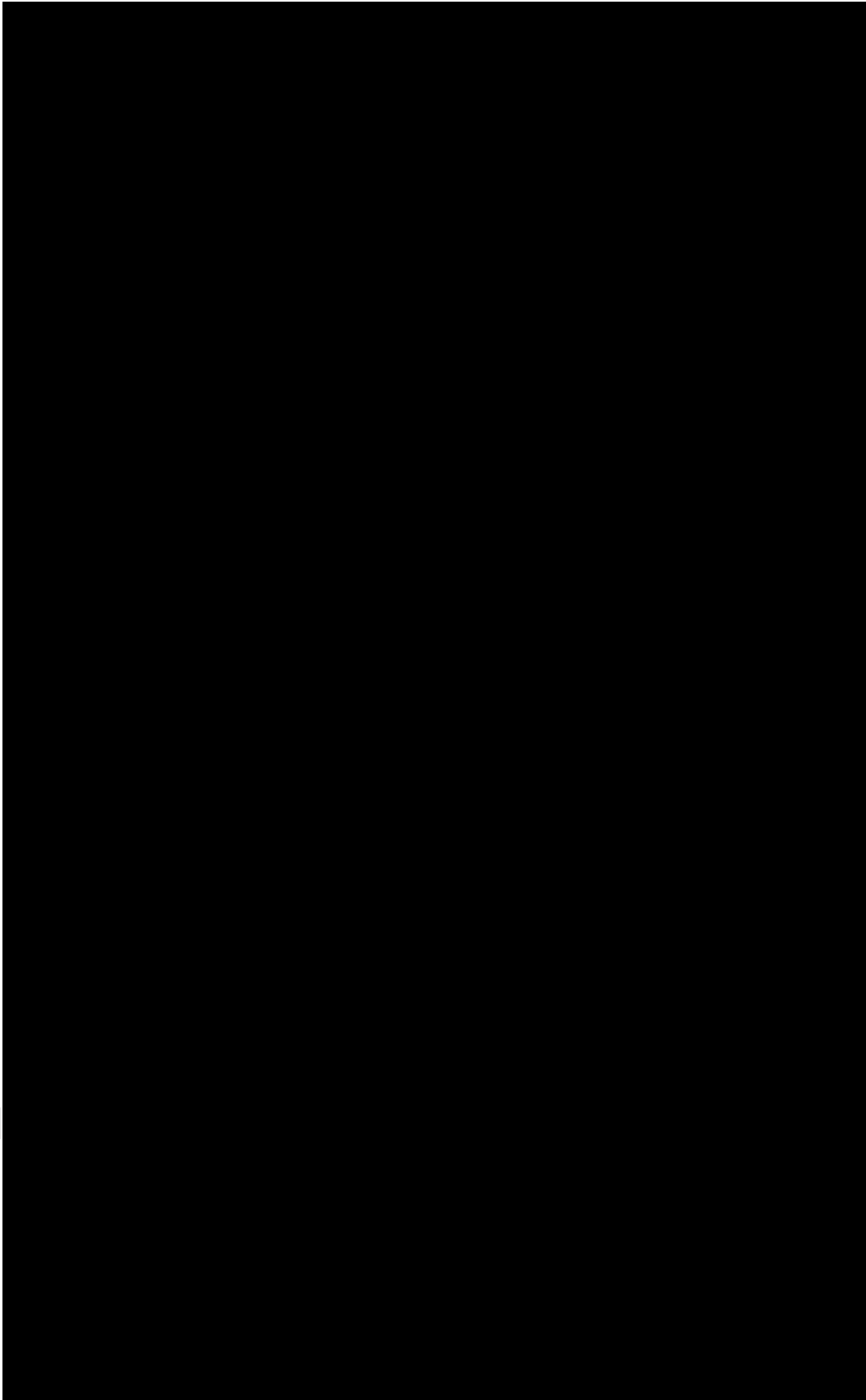
VT	2016
WA	2016
WV	2016
<b>Total</b>	
AK	2017
AR	2017
AZ	2017
CA	2017
CO	2017
CT	2017
DC	2017
DE	2017
FL	2017
IA	2017
ID	2017
IN	2017
KY	2017
LA	2017
MA	2017
MD	2017
MN	2017
MO	2017
MS	2017
MT	2017
NC	2017
ND	2017
NE	2017
NH	2017
NJ	2017
NM	2017
NV	2017
NY	2017
OK	2017
OR	2017
RI	2017
SD	2017
TN	2017
TX	2017
UT	2017
VA	2017
VT	2017
WA	2017
WV	2017
<b>Total</b>	



AK	2018
AR	2018
AZ	2018
CA	2018
CO	2018
CT	2018
DC	2018
DE	2018
FL	2018
IA	2018
ID	2018
IN	2018
KY	2018
LA	2018
MA	2018
MD	2018
MN	2018
MO	2018
MS	2018
MT	2018
NC	2018
ND	2018
NE	2018
NH	2018
NJ	2018
NM	2018
NV	2018
NY	2018
OK	2018
OR	2018
RI	2018
SD	2018
TN	2018
TX	2018
UT	2018
VA	2018
VT	2018
WA	2018
WV	2018
<b>Total</b>	
AK	2019
AR	2019
AZ	2019
CA	2019



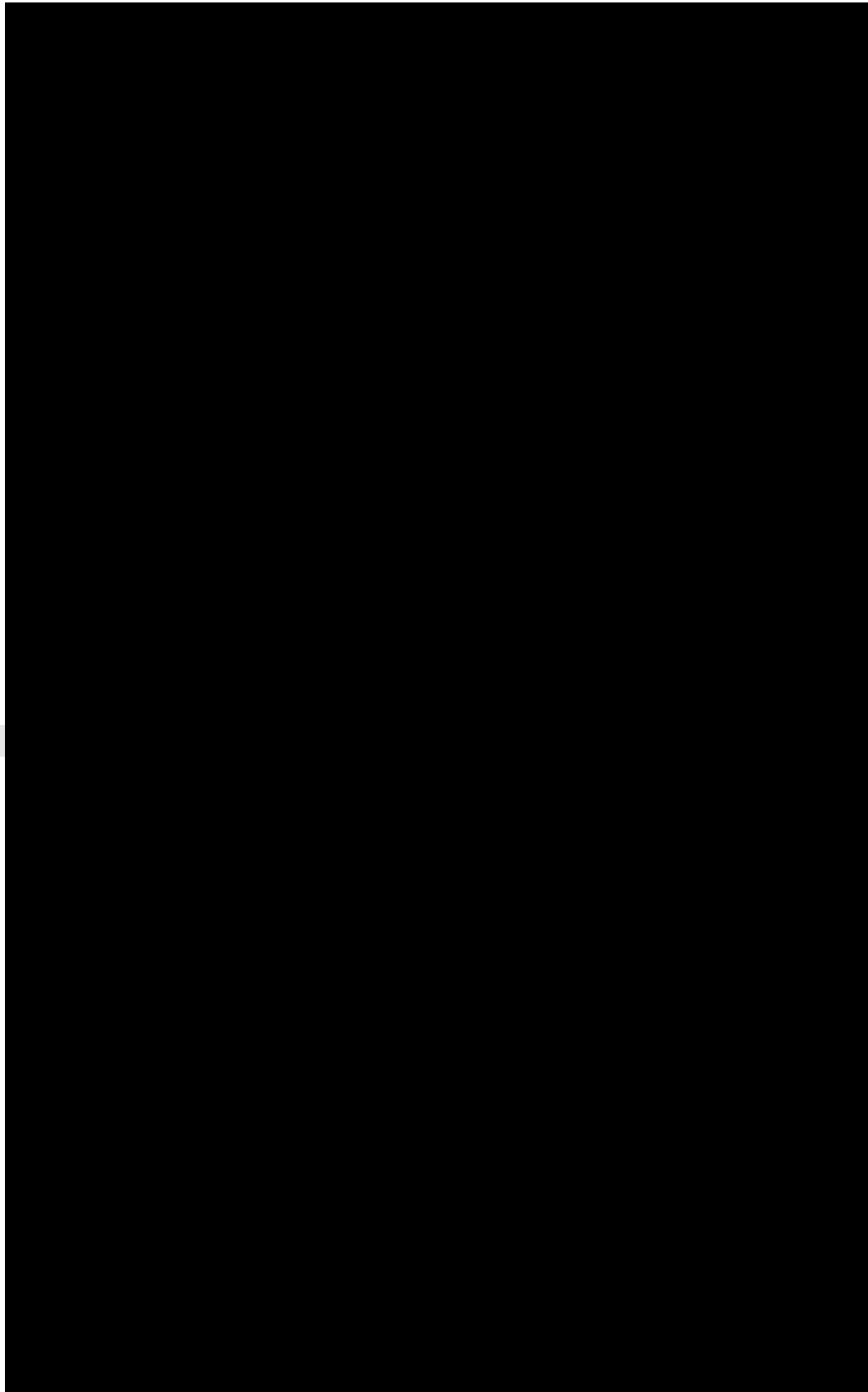
CO	2019
CT	2019
DC	2019
DE	2019
FL	2019
IA	2019
ID	2019
IN	2019
KY	2019
LA	2019
MA	2019
MD	2019
MN	2019
MO	2019
MS	2019
MT	2019
NC	2019
ND	2019
NE	2019
NH	2019
NJ	2019
NM	2019
NV	2019
NY	2019
OK	2019
OR	2019
RI	2019
SD	2019
TN	2019
TX	2019
UT	2019
VA	2019
VT	2019
WA	2019
WV	2019
<b>Total</b>	
AK	2020
AR	2020
AZ	2020
CA	2020
CO	2020
CT	2020
DC	2020
DE	2020

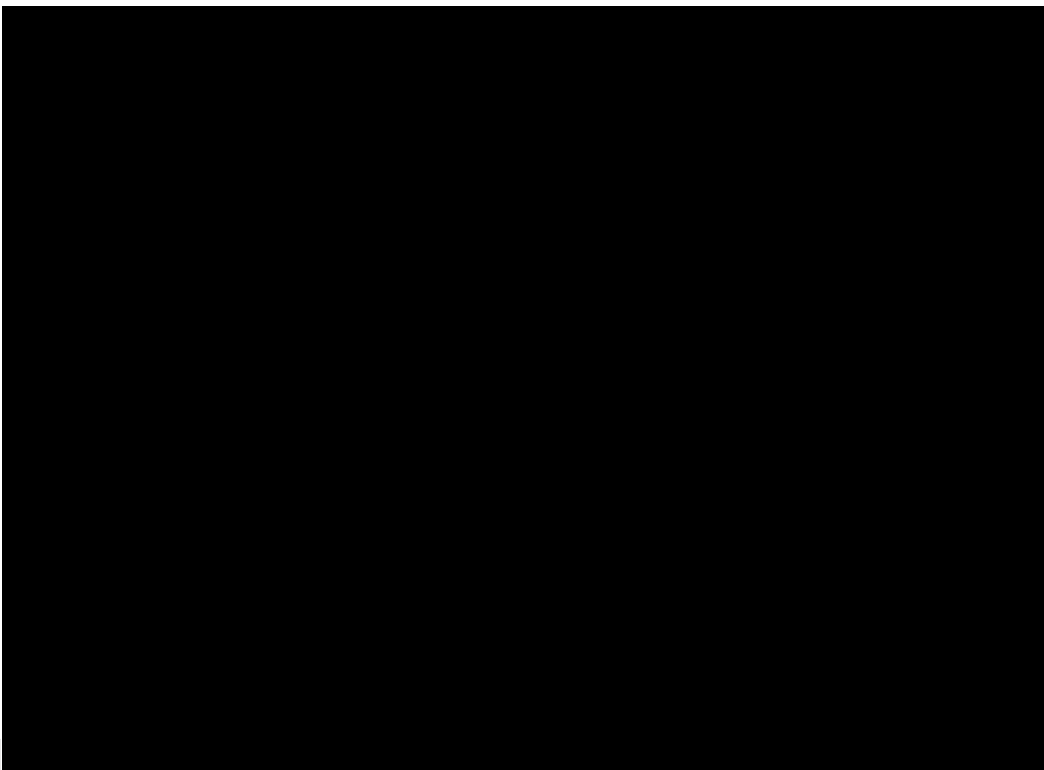


FL	2020
IA	2020
ID	2020
IN	2020
KY	2020
LA	2020
MA	2020
MD	2020
MN	2020
MO	2020
MS	2020
MT	2020
NC	2020
ND	2020
NE	2020
NH	2020
NJ	2020
NM	2020
NV	2020
NY	2020
OK	2020
OR	2020
RI	2020
SD	2020
TN	2020
TX	2020
UT	2020
VA	2020
VT	2020
WA	2020
WV	2020
<b>Total</b>	
AK	2021
AR	2021
AZ	2021
CA	2021
CO	2021
CT	2021
DC	2021
DE	2021
FL	2021
IA	2021
ID	2021
IN	2021

KY	2021
LA	2021
MA	2021
MD	2021
MN	2021
MO	2021
MS	2021
MT	2021
NC	2021
ND	2021
NE	2021
NH	2021
NJ	2021
NM	2021
NV	2021
NY	2021
OK	2021
OR	2021
RI	2021
SD	2021
TN	2021
TX	2021
UT	2021
VA	2021
VT	2021
WA	2021
WV	2021
<b>Total</b>	
AK	2022
AR	2022
AZ	2022
CA	2022
CO	2022
CT	2022
DC	2022
DE	2022
FL	2022
IA	2022
ID	2022
IN	2022
KY	2022
LA	2022
MA	2022
MD	2022

MN	2022
MO	2022
MS	2022
MT	2022
NC	2022
ND	2022
NE	2022
NH	2022
NJ	2022
NM	2022
NV	2022
NY	2022
OK	2022
OR	2022
RI	2022
SD	2022
TN	2022
TX	2022
UT	2022
VA	2022
VT	2022
WA	2022
WV	2022
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AR	2023
AZ	2023
CA	2023
CO	2023
CT	2023
DC	2023
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FL	2023
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MD	2023
MN	2023
MO	2023
MS	2023
MT	2023



NC	2023	
ND	2023	
NE	2023	
NH	2023	
NJ	2023	
NM	2023	
NV	2023	
NY	2023	
OK	2023	
OR	2023	
RI	2023	
SD	2023	
TN	2023	
TX	2023	
UT	2023	
VA	2023	
VT	2023	
WA	2023	
WV	2023	
Total		

*Notes:* See notes in Exhibit I.1.

*Sources:* See sources in Exhibit I.1.

**Appendix J****Damages Exhibits, for all U.S. Consumers, by Year and State, August 16, 2016 – June 5, 2023 (in USD)****Exhibit J.1****Damages Due to Direct Effects on Prices for all U.S. Consumers,  
by Year and State, August 16, 2016 – June 5, 2023 (in USD)**

State	Year	Pooled Markets			In-App Billing Services Market		
		Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only	Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only
AA	2016						
AE	2016						
AK	2016						
AL	2016						
AP	2016						
AR	2016						
AS	2016						
AZ	2016						
CA	2016						
CO	2016						
CT	2016						
DC	2016						
DE	2016						
FL	2016						
FM	2016						
GA	2016						
GU	2016						
HI	2016						
IA	2016						
ID	2016						
IL	2016						
IN	2016						
KS	2016						
KY	2016						
LA	2016						
MA	2016						
MD	2016						
ME	2016						
MH	2016						
MI	2016						
MN	2016						
MO	2016						
MP	2016						
MS	2016						
MT	2016						

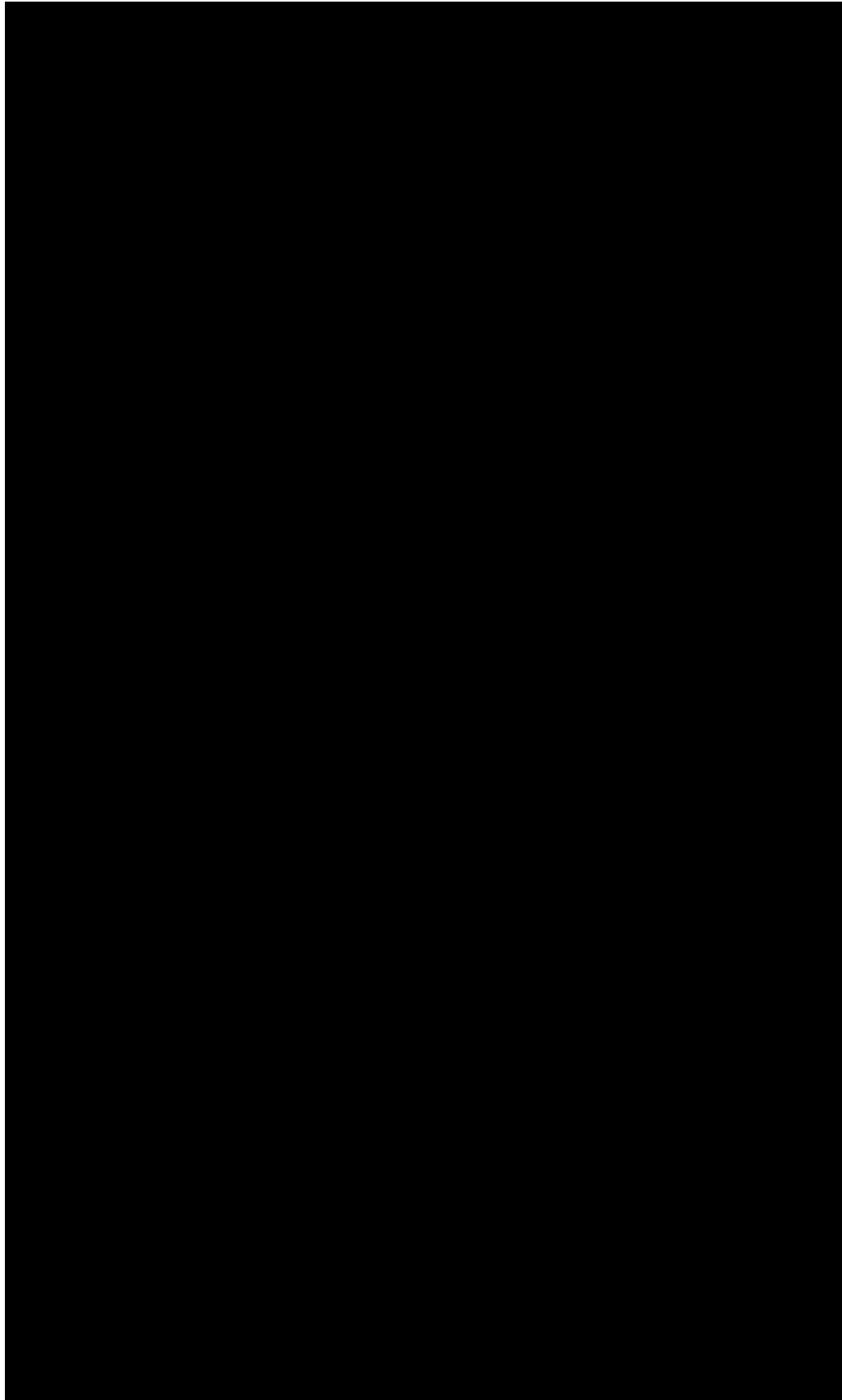


NC	2016
ND	2016
NE	2016
NH	2016
NJ	2016
NM	2016
NV	2016
NY	2016
OH	2016
OK	2016
OR	2016
PA	2016
PR	2016
PW	2016
RI	2016
SC	2016
SD	2016
TN	2016
TX	2016
UT	2016
VA	2016
VI	2016
VT	2016
WA	2016
WI	2016
WV	2016
WY	2016

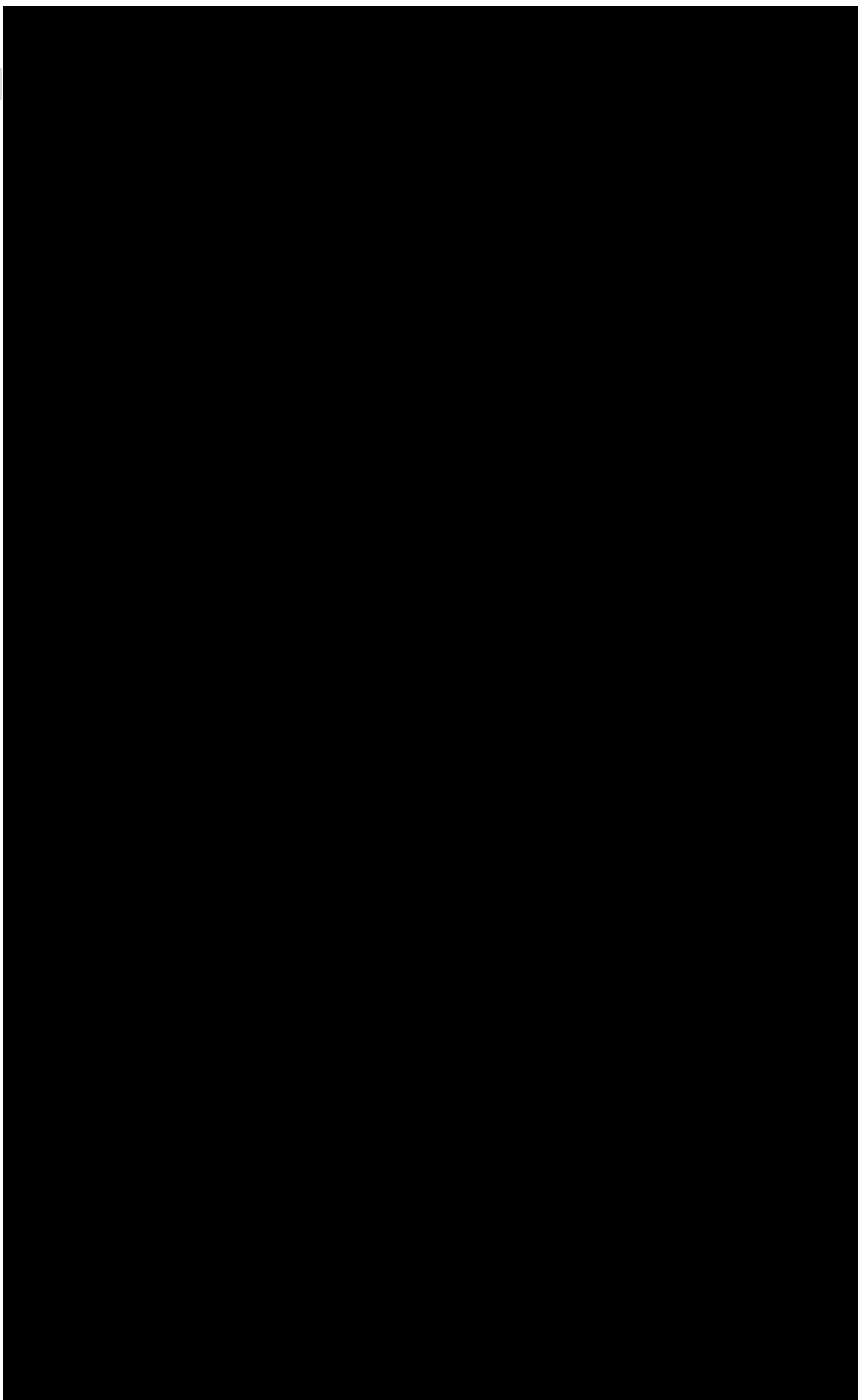
<b>Total</b>	
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AA	2017
AE	2017
AK	2017
AL	2017
AP	2017
AR	2017
AS	2017
AZ	2017
CA	2017
CO	2017
CT	2017
DC	2017
DE	2017
FL	2017
FM	2017
GA	2017

GU	2017
HI	2017
IA	2017
ID	2017
IL	2017
IN	2017
KS	2017
KY	2017
LA	2017
MA	2017
MD	2017
ME	2017
MH	2017
MI	2017
MN	2017
MO	2017
MP	2017
MS	2017
MT	2017
NC	2017
ND	2017
NE	2017
NH	2017
NJ	2017
NM	2017
NV	2017
NY	2017
OH	2017
OK	2017
OR	2017
PA	2017
PR	2017
PW	2017
RI	2017
SC	2017
SD	2017
TN	2017
TX	2017
UT	2017
VA	2017
VI	2017
VT	2017
WA	2017
WI	2017



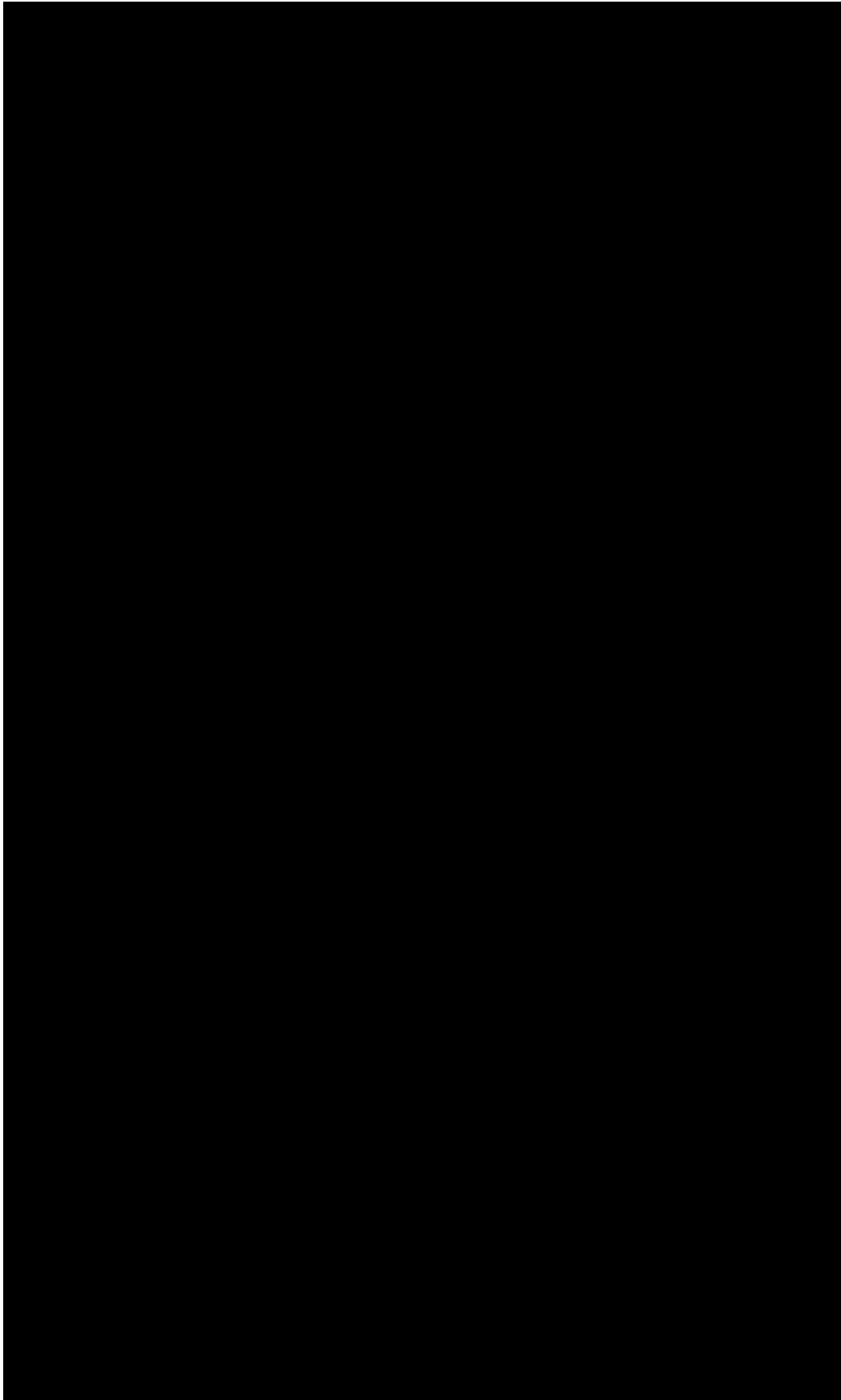
WV	2017
WY	2017
<b>Total</b>	
AA	2018
AE	2018
AK	2018
AL	2018
AP	2018
AR	2018
AS	2018
AZ	2018
CA	2018
CO	2018
CT	2018
DC	2018
DE	2018
FL	2018
FM	2018
GA	2018
GU	2018
HI	2018
IA	2018
ID	2018
IL	2018
IN	2018
KS	2018
KY	2018
LA	2018
MA	2018
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WY	2018
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WI	2019
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WY	2019
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PR	2020



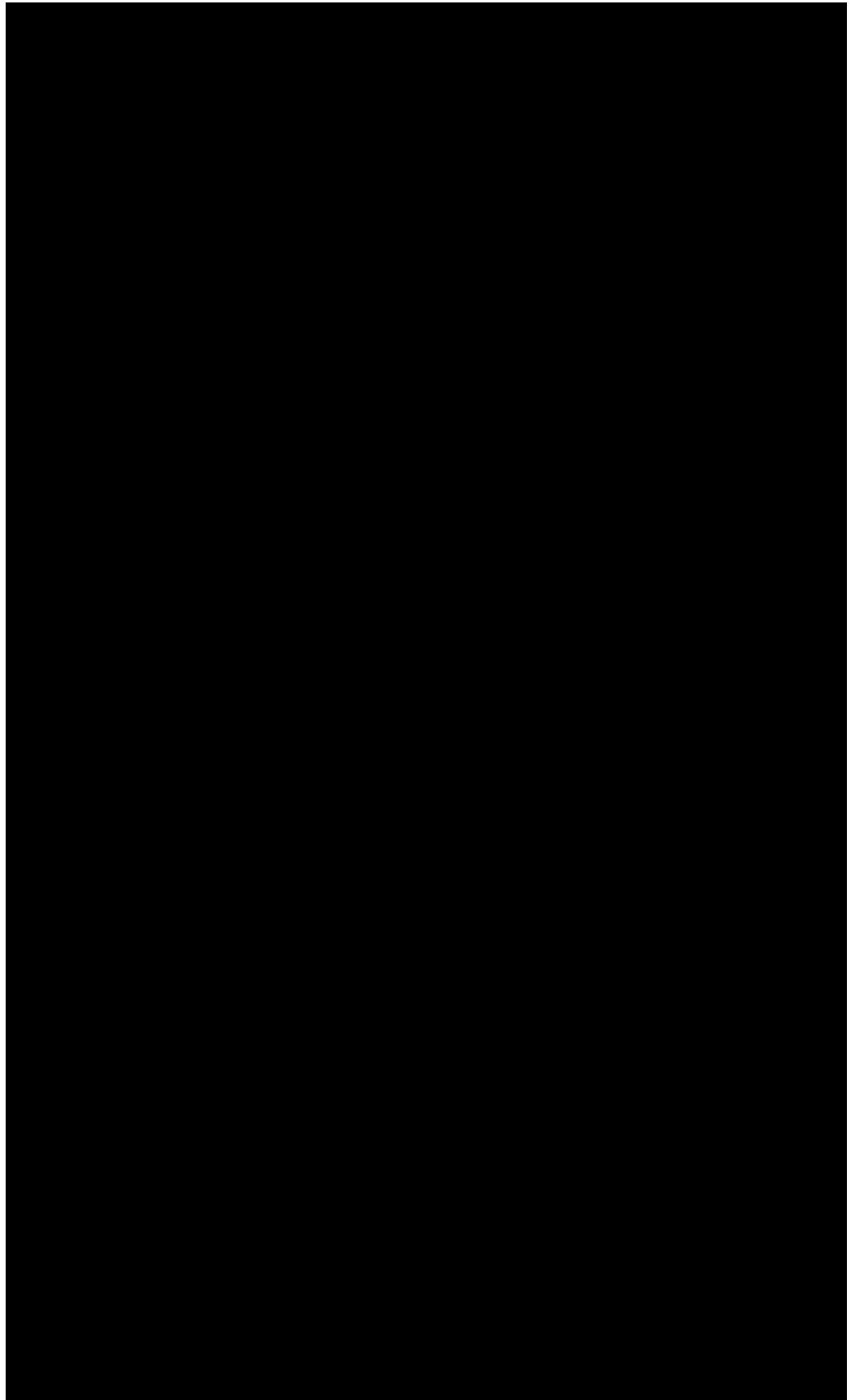


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SC	2020
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VI	2020
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WA	2020
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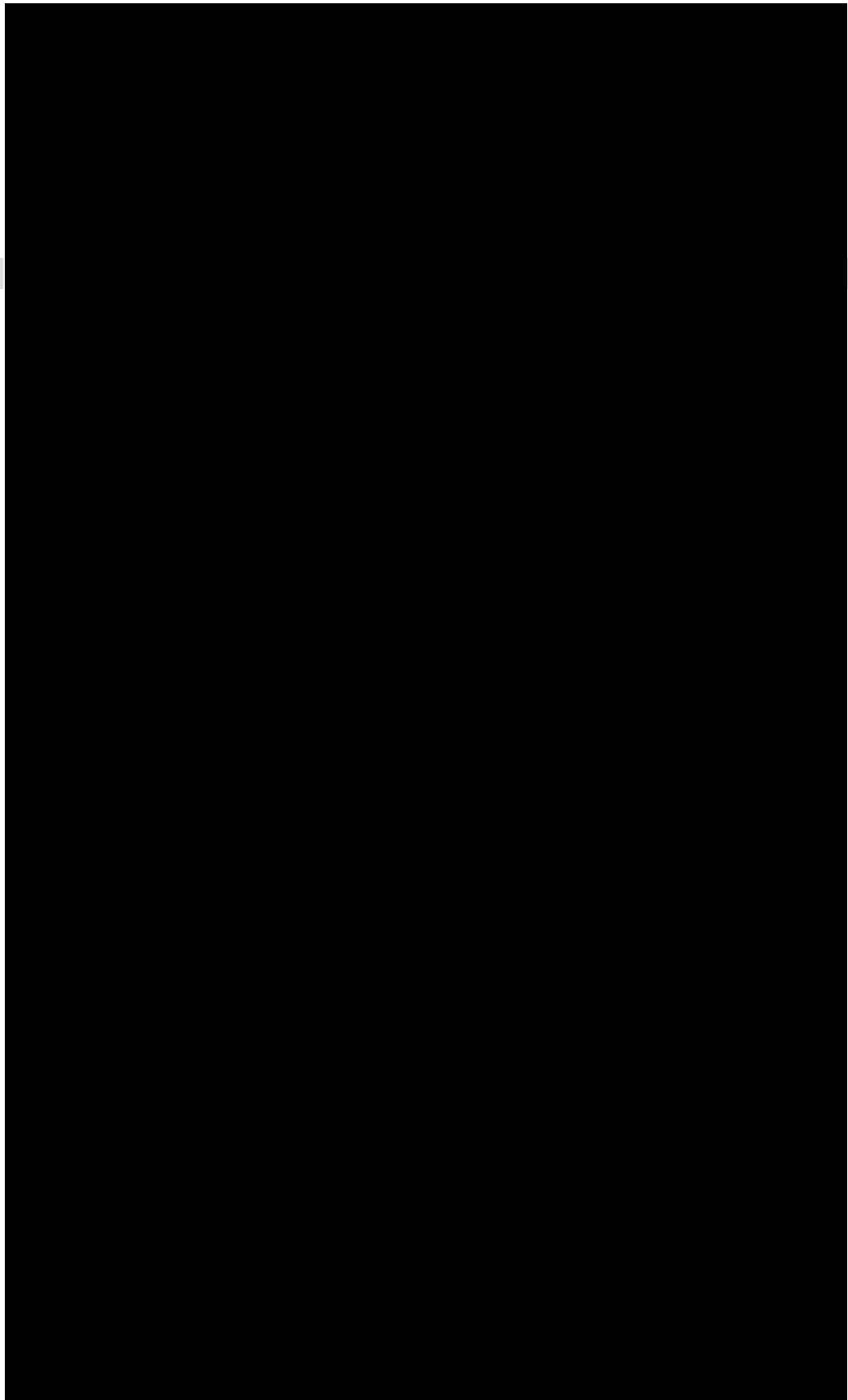


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WY	2021
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UT	2022
VA	2022
VI	2022
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WA	2022
WI	2022
WV	2022
WY	2022
<b>Total</b>	
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UT	2023	
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VI	2023	
VT	2023	
WA	2023	
WI	2023	
WV	2023	
WY	2023	
<b>Total</b>		

*Notes:*

1. These figures utilize data for all states (excluding missing states) from August 16, 2016 through May 31, 2022 to calibrate my damages model.
2. To only account for the share of phones and tablets in damages, in allocating damages across state/years, I multiply net consumer spend by the share of net consumer spend for phones, tablets and missing device types for each year using the Google Monthly App Revenue Data.
3. I extrapolate net spend for June 1, 2022 through June 5, 2023 using a regression of net consumer spend on a time trend and a constant, using 2018-2022 data from the Google Transaction Data and the Google Monthly App Revenue Data. Consequently, I allocate net consumer spend proportionally by state according to the percent distribution of net spend over states for the years 2018 through 2022.

*Sources:*

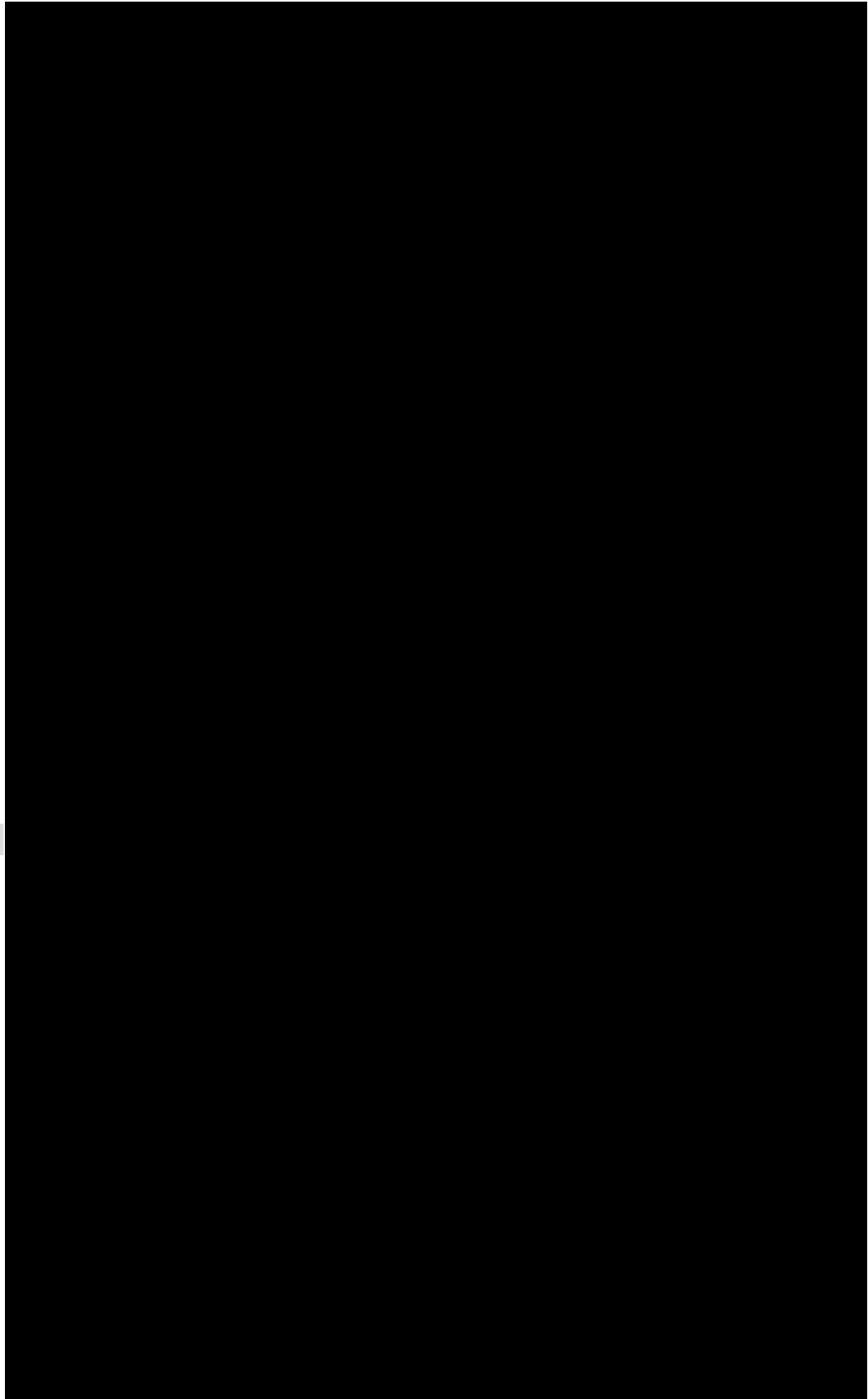
1. Google Transaction Data.
2. Google Monthly App Revenue Data.
3. Census State Code Crosswalk.

**Exhibit J.2**  
**Damages Due to Variety Effects for all U.S. Consumers,**  
**by Year and State, August 16, 2016 – June 5, 2023 (in USD)**

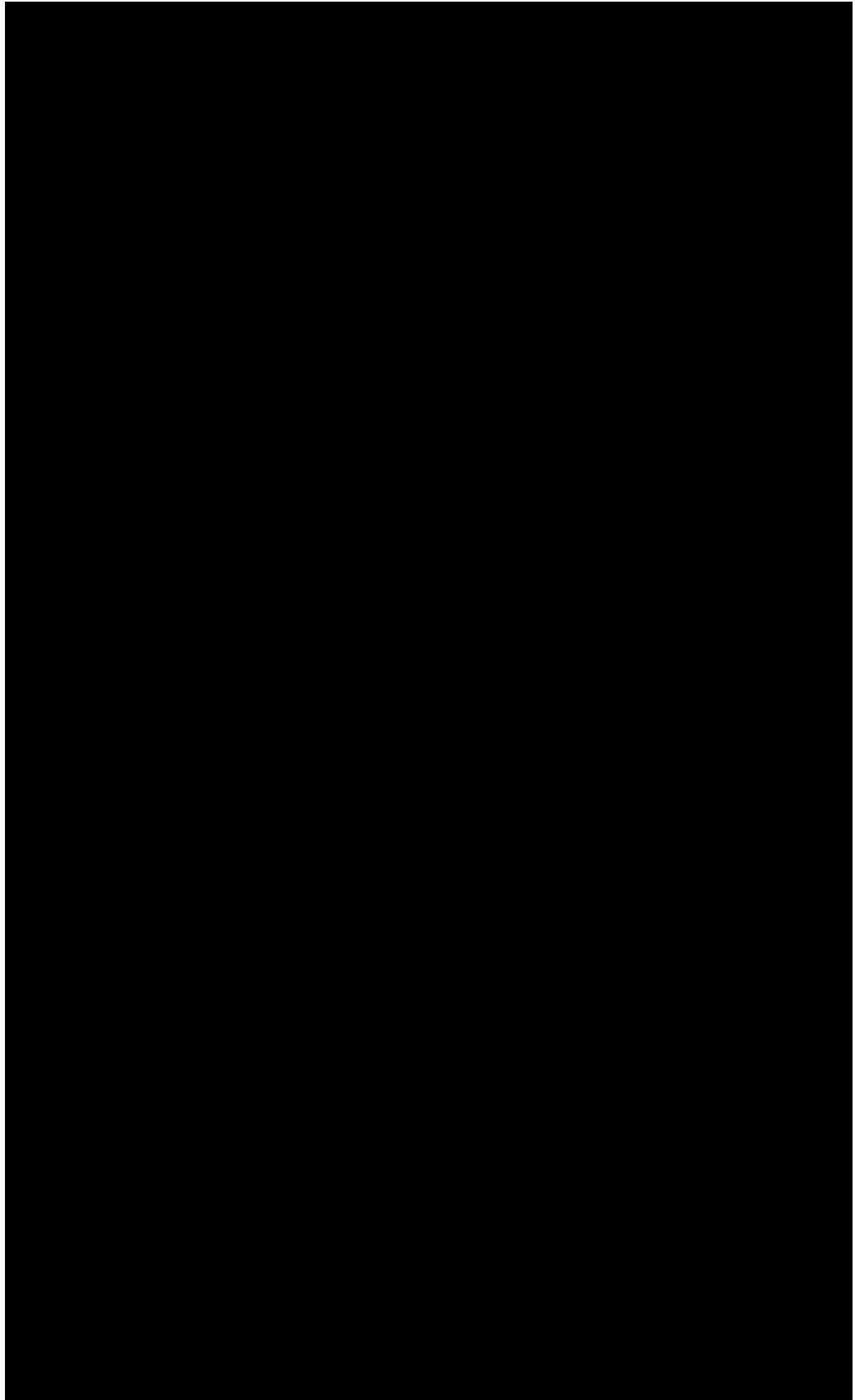
State	Year	Pooled Markets			In-App Billing Services Market		
		Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only	Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only
AA	2016						
AE	2016						
AK	2016						
AL	2016						
AP	2016						
AR	2016						
AS	2016						
AZ	2016						
CA	2016						
CO	2016						
CT	2016						
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LA	2016						
MA	2016						
MD	2016						
ME	2016						
MH	2016						
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MN	2016						
MO	2016						
MP	2016						
MS	2016						
MT	2016						
NC	2016						



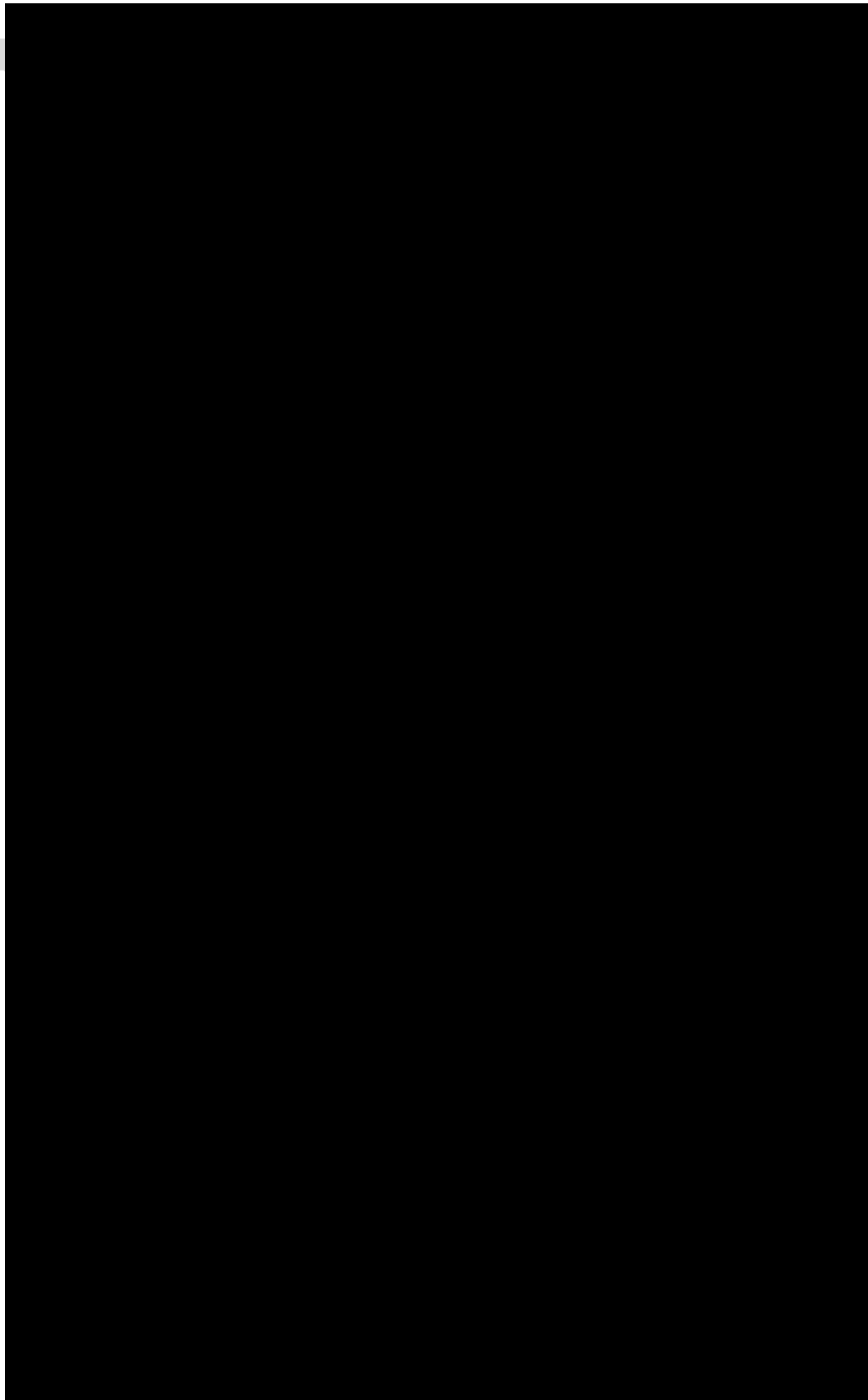
ND	2016
NE	2016
NH	2016
NJ	2016
NM	2016
NV	2016
NY	2016
OH	2016
OK	2016
OR	2016
PA	2016
PR	2016
PW	2016
RI	2016
SC	2016
SD	2016
TN	2016
TX	2016
UT	2016
VA	2016
VI	2016
VT	2016
WA	2016
WI	2016
WV	2016
WY	2016
<b>Total</b>	
AA	2017
AE	2017
AK	2017
AL	2017
AP	2017
AR	2017
AS	2017
AZ	2017
CA	2017
CO	2017
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DC	2017
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FL	2017
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GA	2017
GU	2017



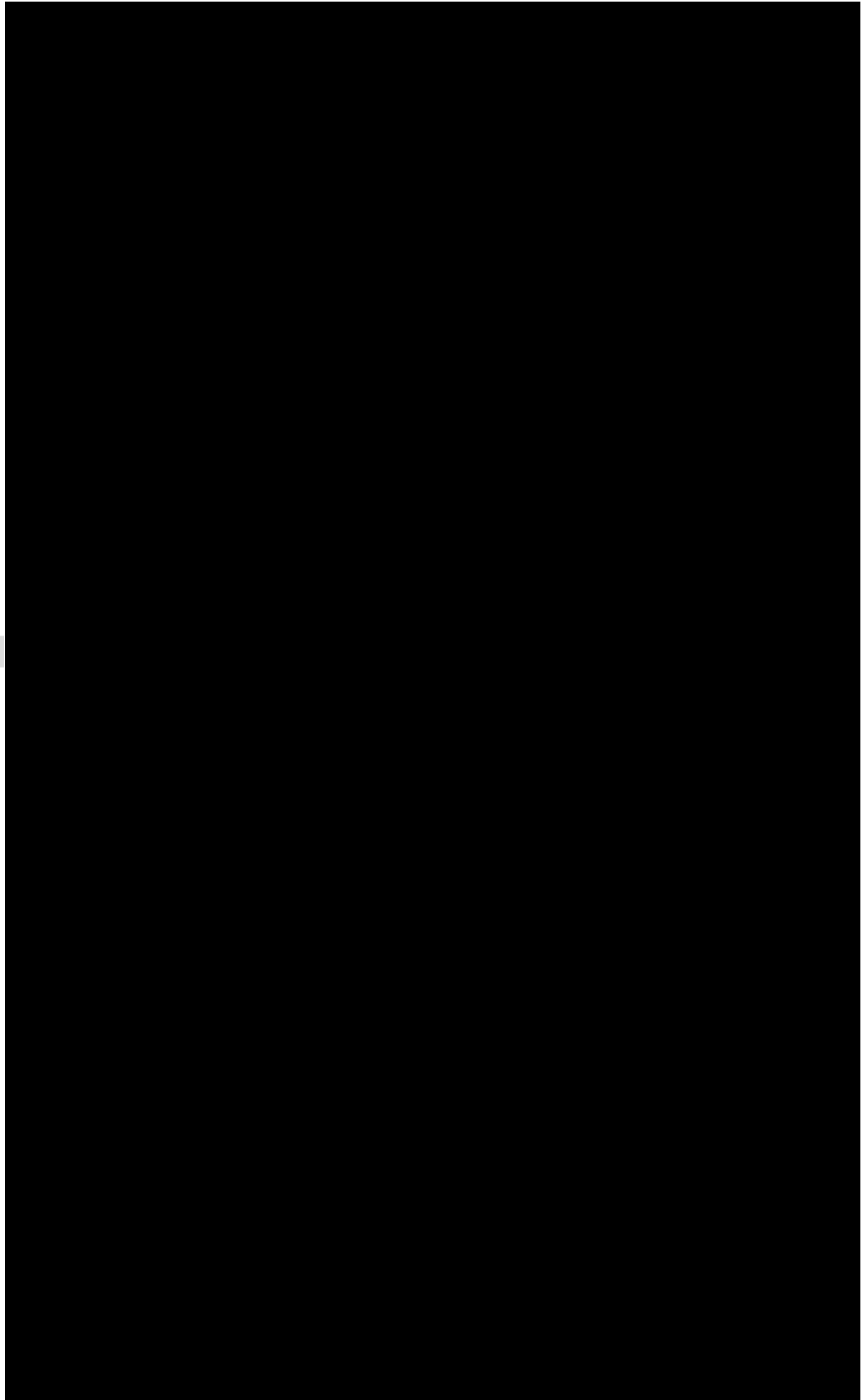
HI	2017
IA	2017
ID	2017
IL	2017
IN	2017
KS	2017
KY	2017
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MA	2017
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MI	2017
MN	2017
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NC	2017
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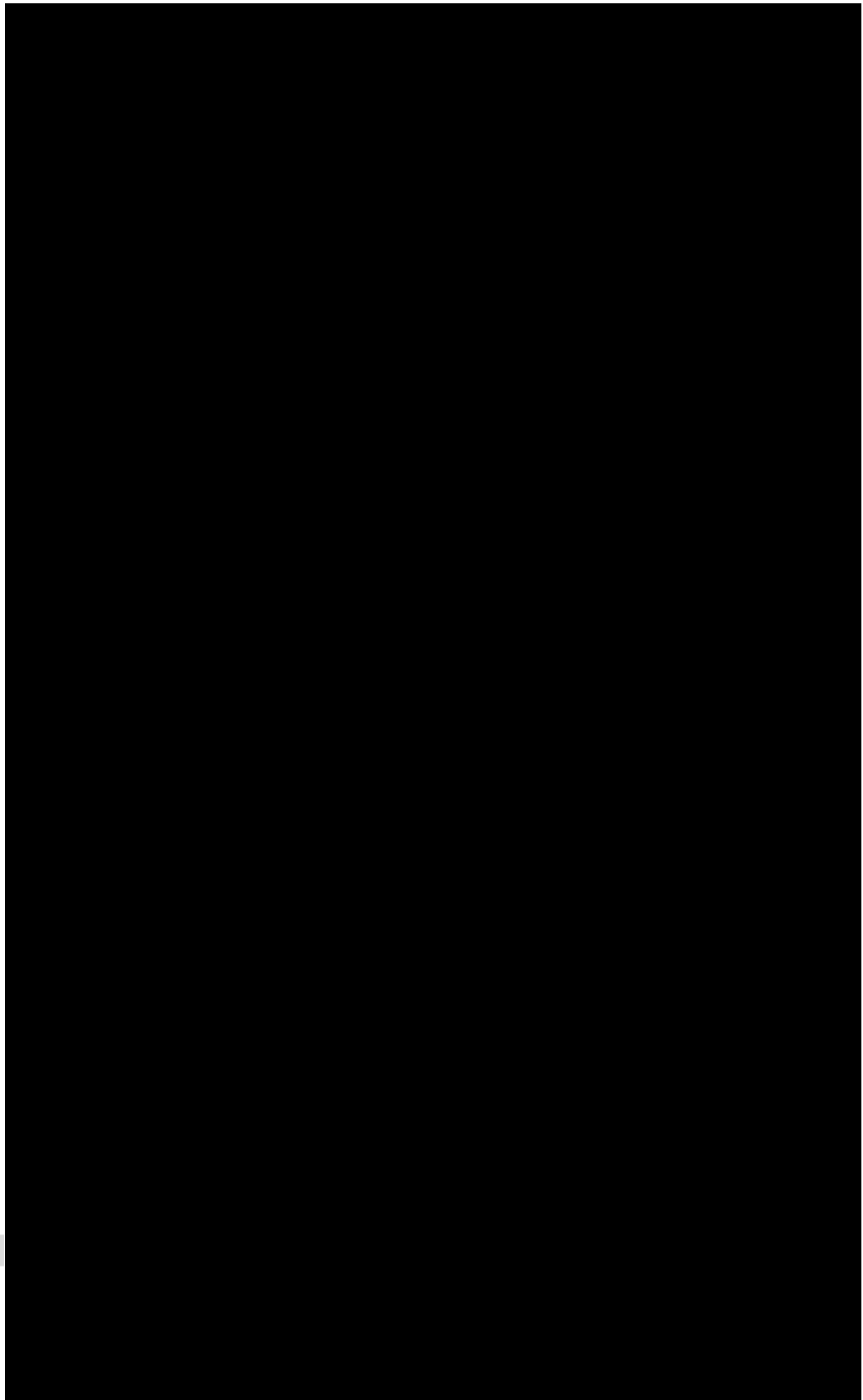
WY	2017
<b>Total</b>	
AA	2018
AE	2018
AK	2018
AL	2018
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DC	2018
DE	2018
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NV	2018



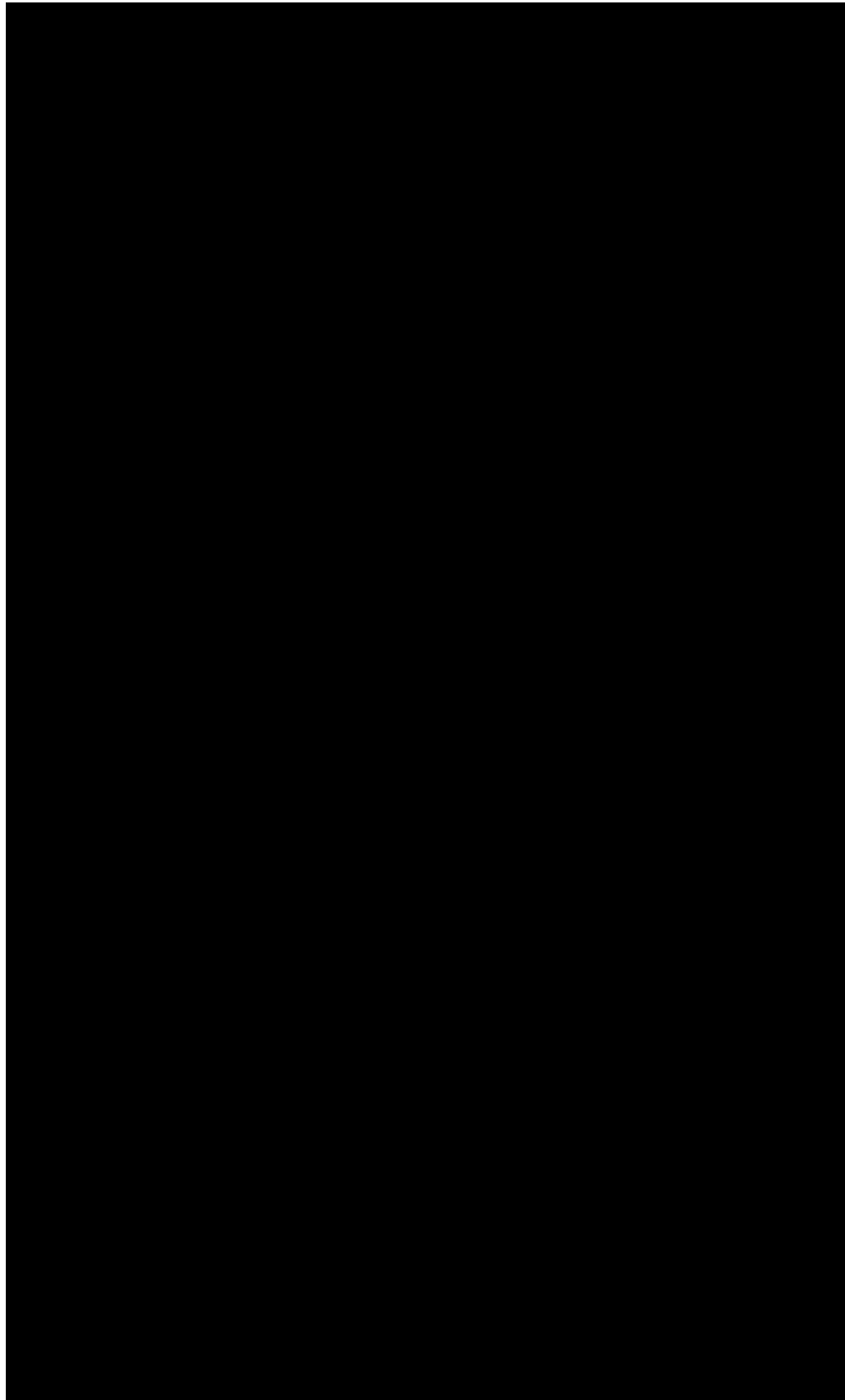
NY	2018
OH	2018
OK	2018
OR	2018
PA	2018
PR	2018
PW	2018
RI	2018
SC	2018
SD	2018
TN	2018
TX	2018
UT	2018
VA	2018
VI	2018
VT	2018
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WI	2018
WV	2018
WY	2018
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TX	2019
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VT	2019
WA	2019
WI	2019
WV	2019
WY	2019
<b>Total</b>	
AA	2020
AE	2020
AK	2020
AL	2020

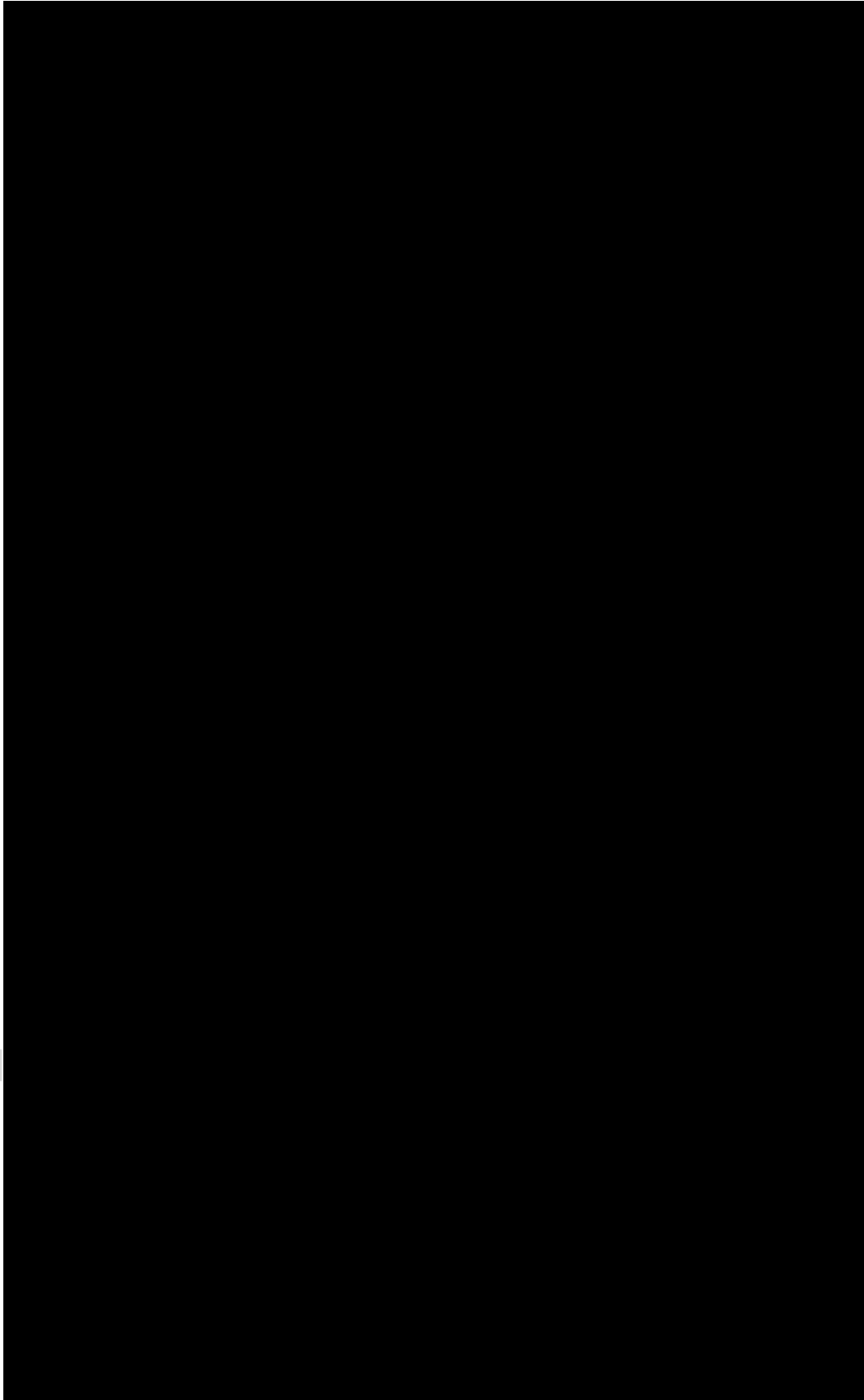


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OR	2020
PA	2020
PR	2020

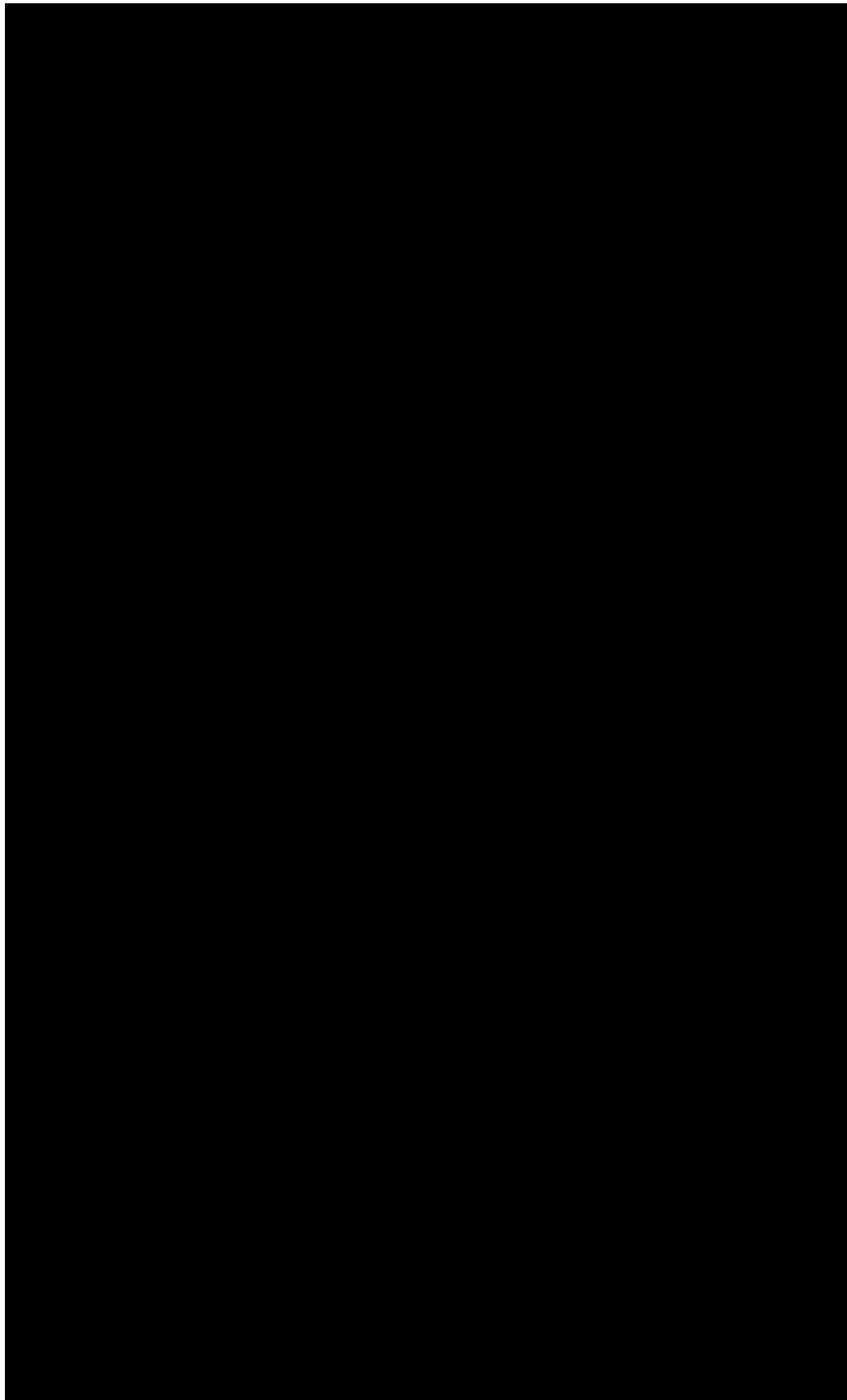


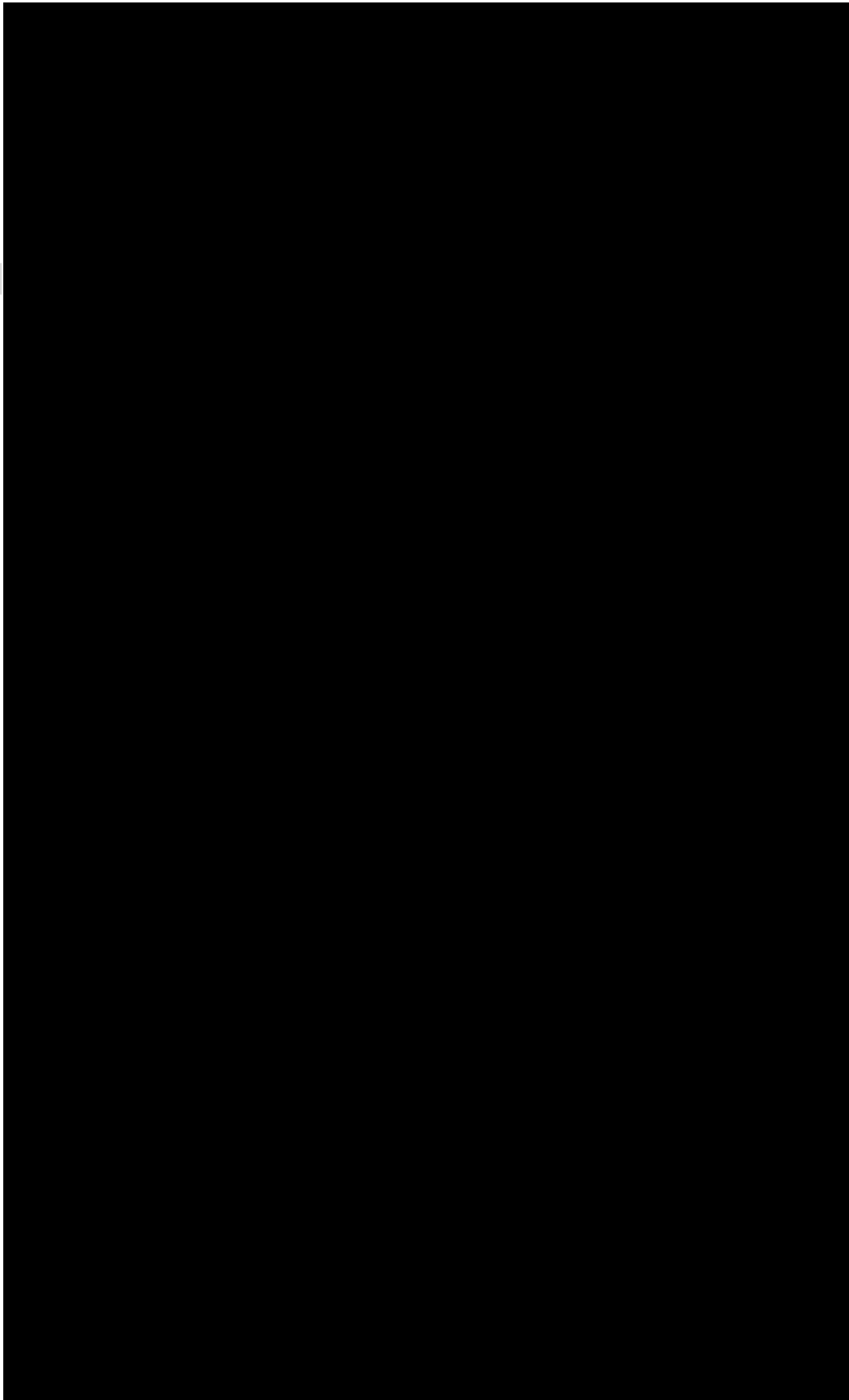


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<b>Total</b>	
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WY	2021	
Total		
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Total		
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VA	2023	
VI	2023	
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WI	2023	
WV	2023	
WY	2023	
<b>Total</b>		

*Notes:* See notes in Exhibit J.1.

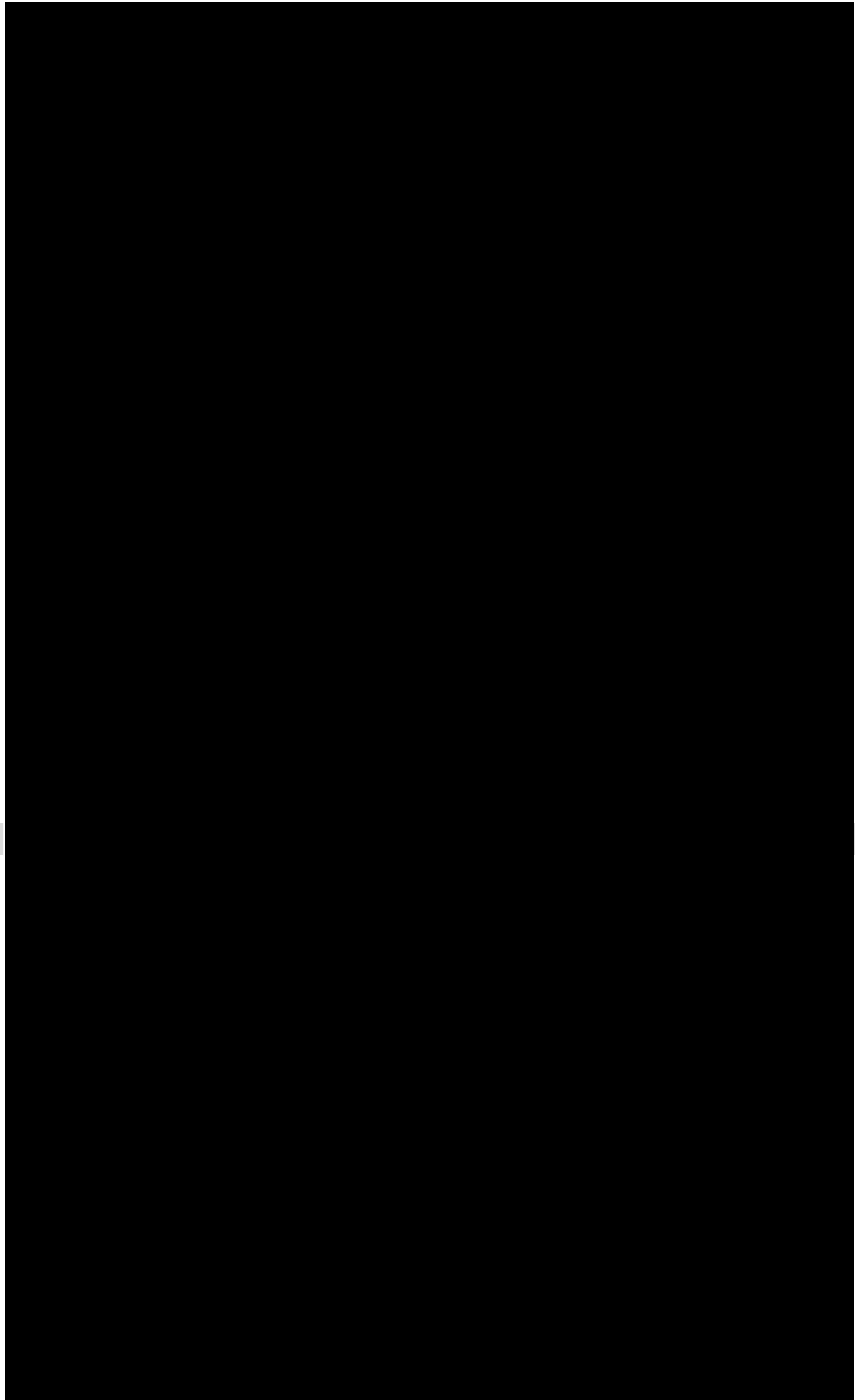
*Sources:* See sources in Exhibit J.1.

**Exhibit J.3**  
**Total Damages for all U.S. Consumers,**  
**by Year and State, August 16, 2016 – June 5, 2023 (in USD)**

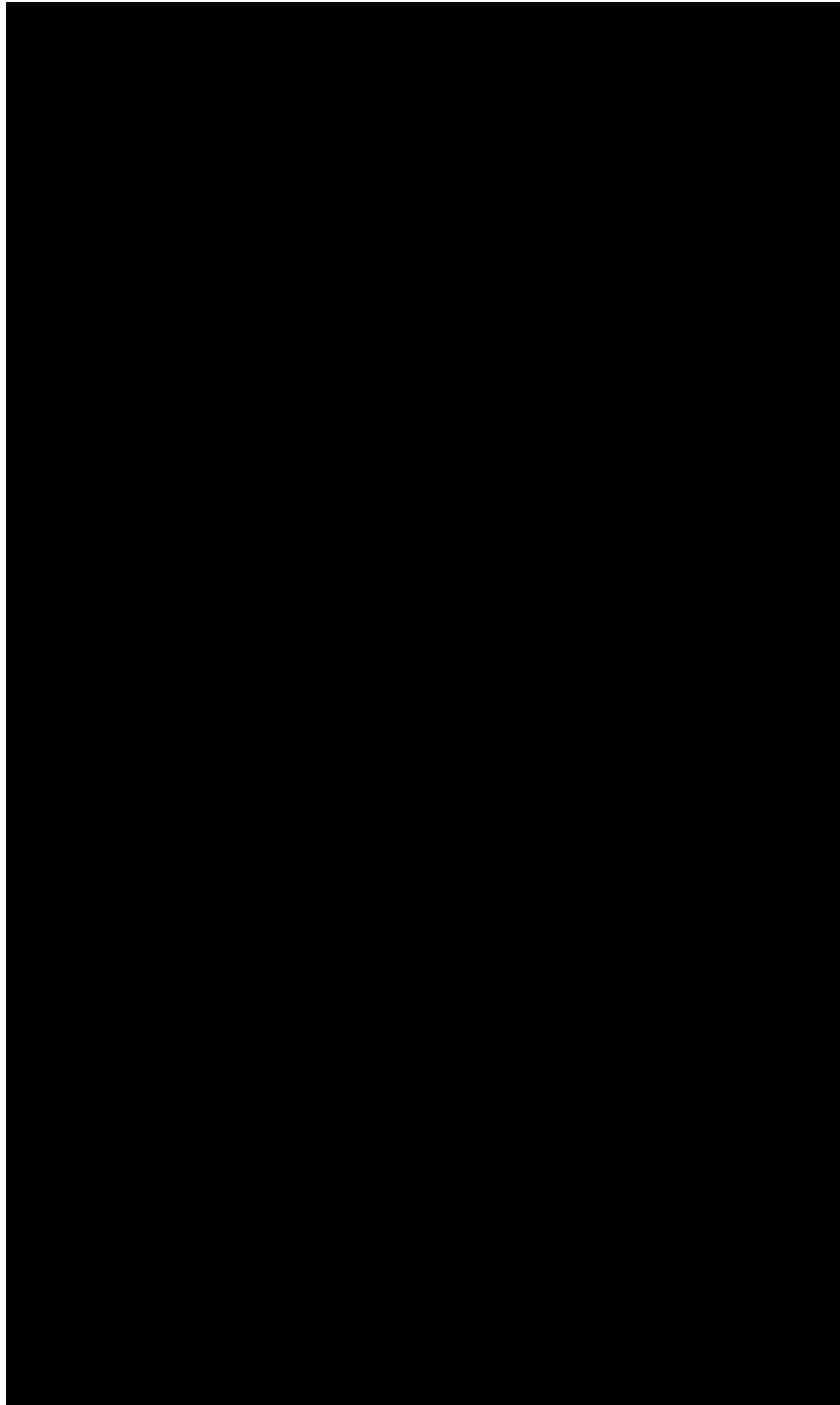
State	Year	Pooled Markets			In-App Billing Services Market		
		Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only	Commission and Playpoints Effects	Commission Effects Only	Playpoints Effects Only
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AE	2016						
AK	2016						
AL	2016						
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LA	2016						
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MT	2016						
NC	2016						



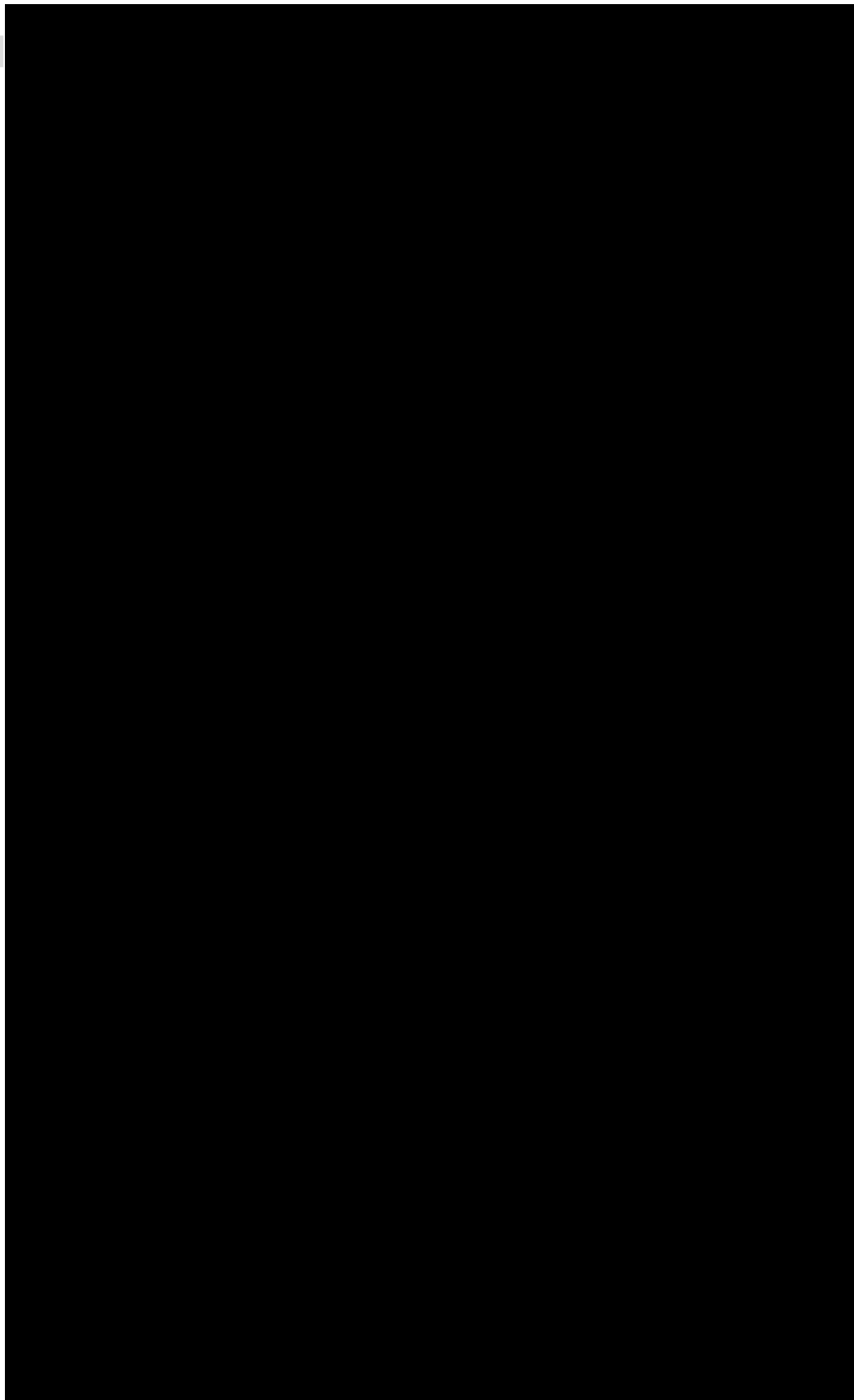
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OH	2016
OK	2016
OR	2016
PA	2016
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RI	2016
SC	2016
SD	2016
TN	2016
TX	2016
UT	2016
VA	2016
VI	2016
VT	2016
WA	2016
WI	2016
WV	2016
WY	2016
<b>Total</b>	
AA	2017
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AK	2017
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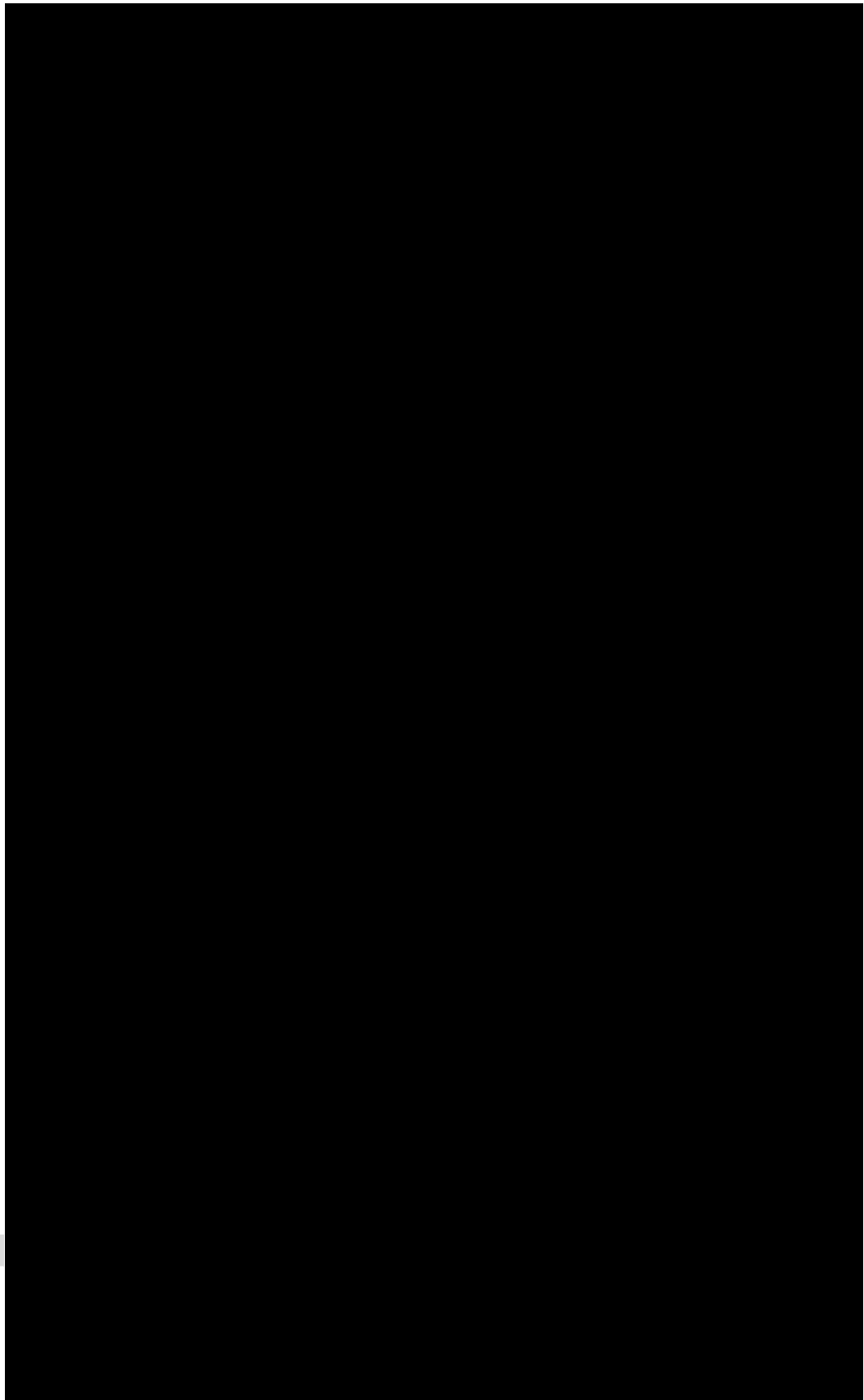
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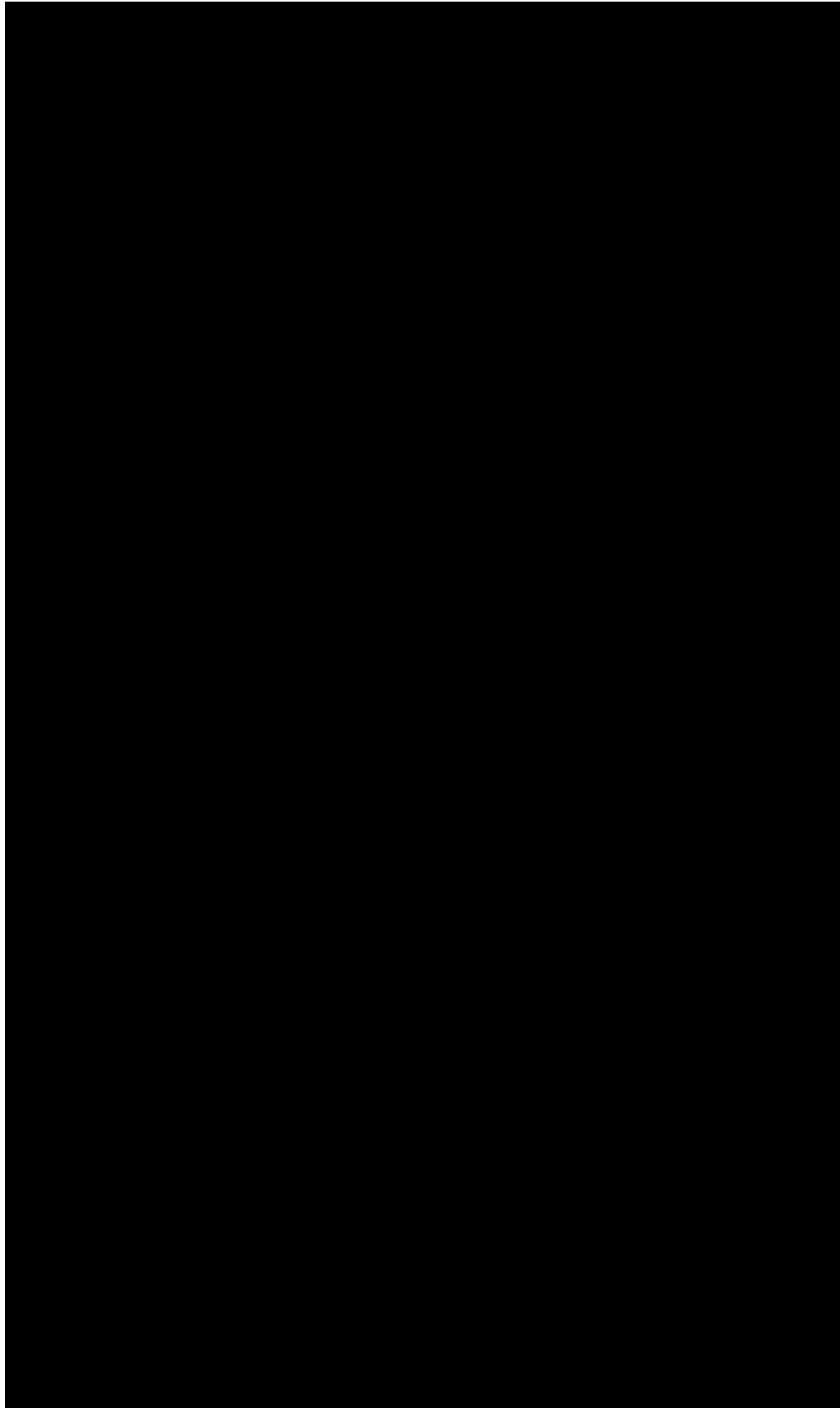
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WI	2018
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WY	2018
<b>Total</b>	
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VA	2019
VI	2019
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WI	2019
WV	2019
WY	2019
<b>Total</b>	
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AK	2020
AL	2020

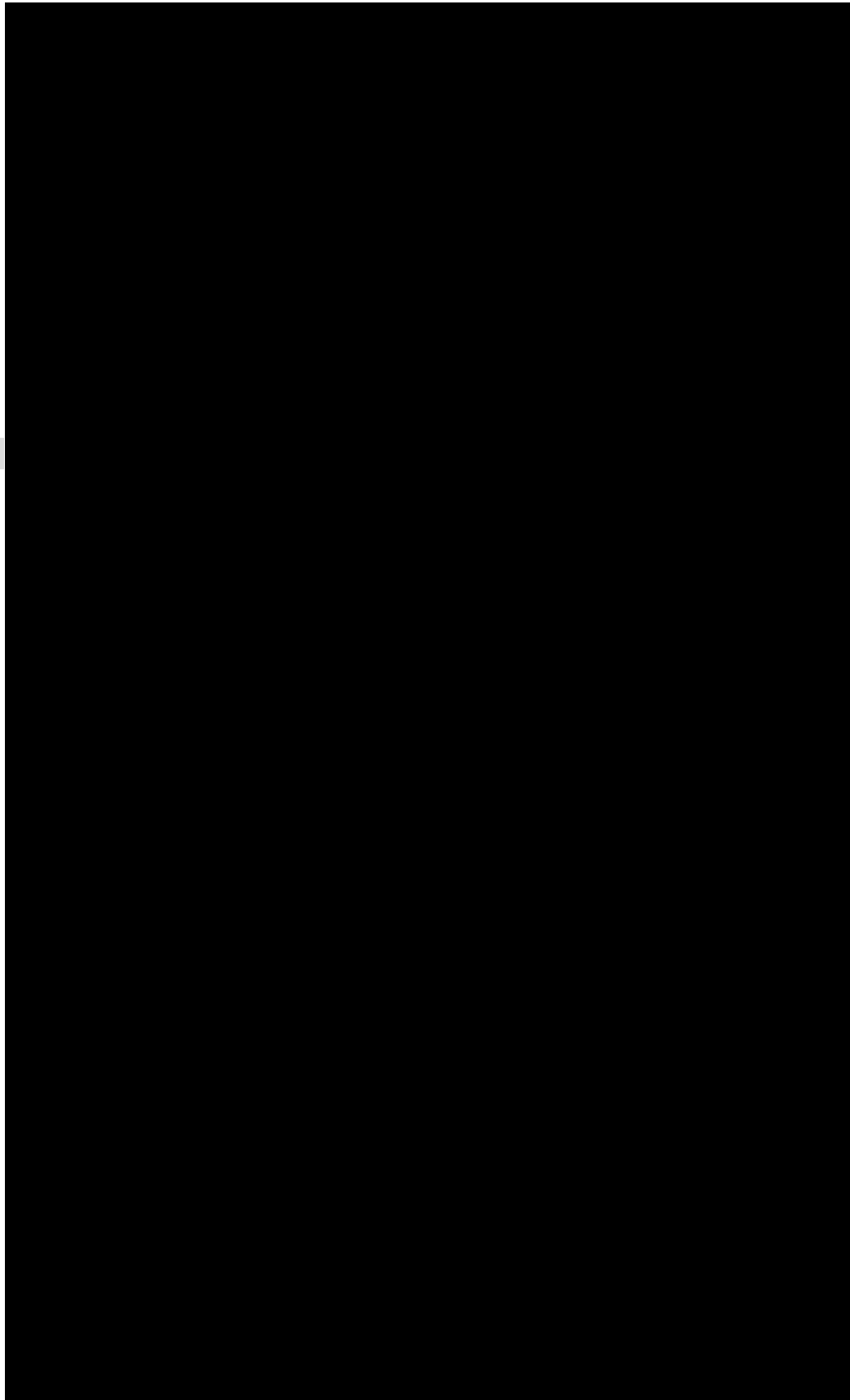


AP	2020
AR	2020
AS	2020
AZ	2020
CA	2020
CO	2020
CT	2020
DC	2020
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FL	2020
FM	2020
GA	2020
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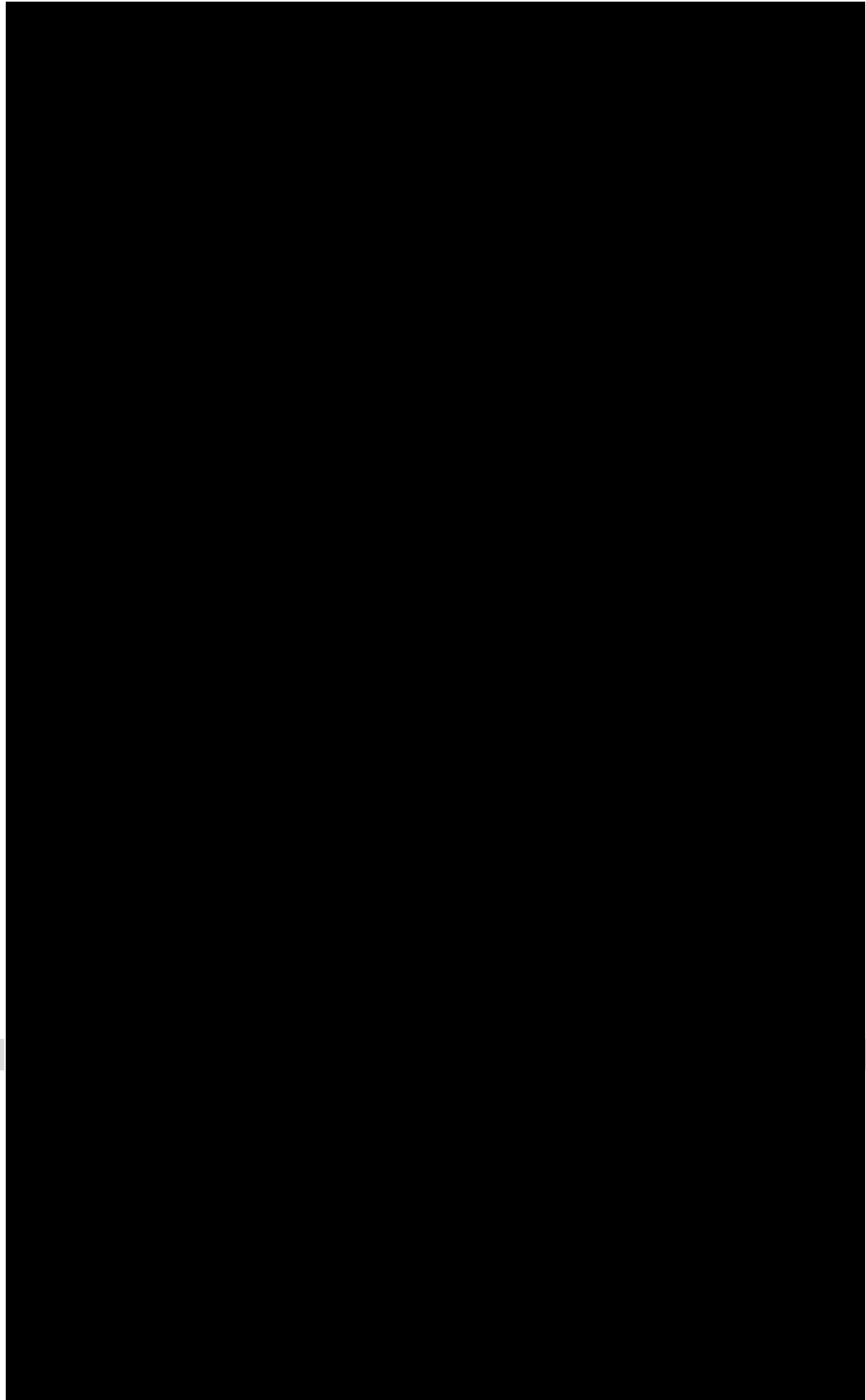




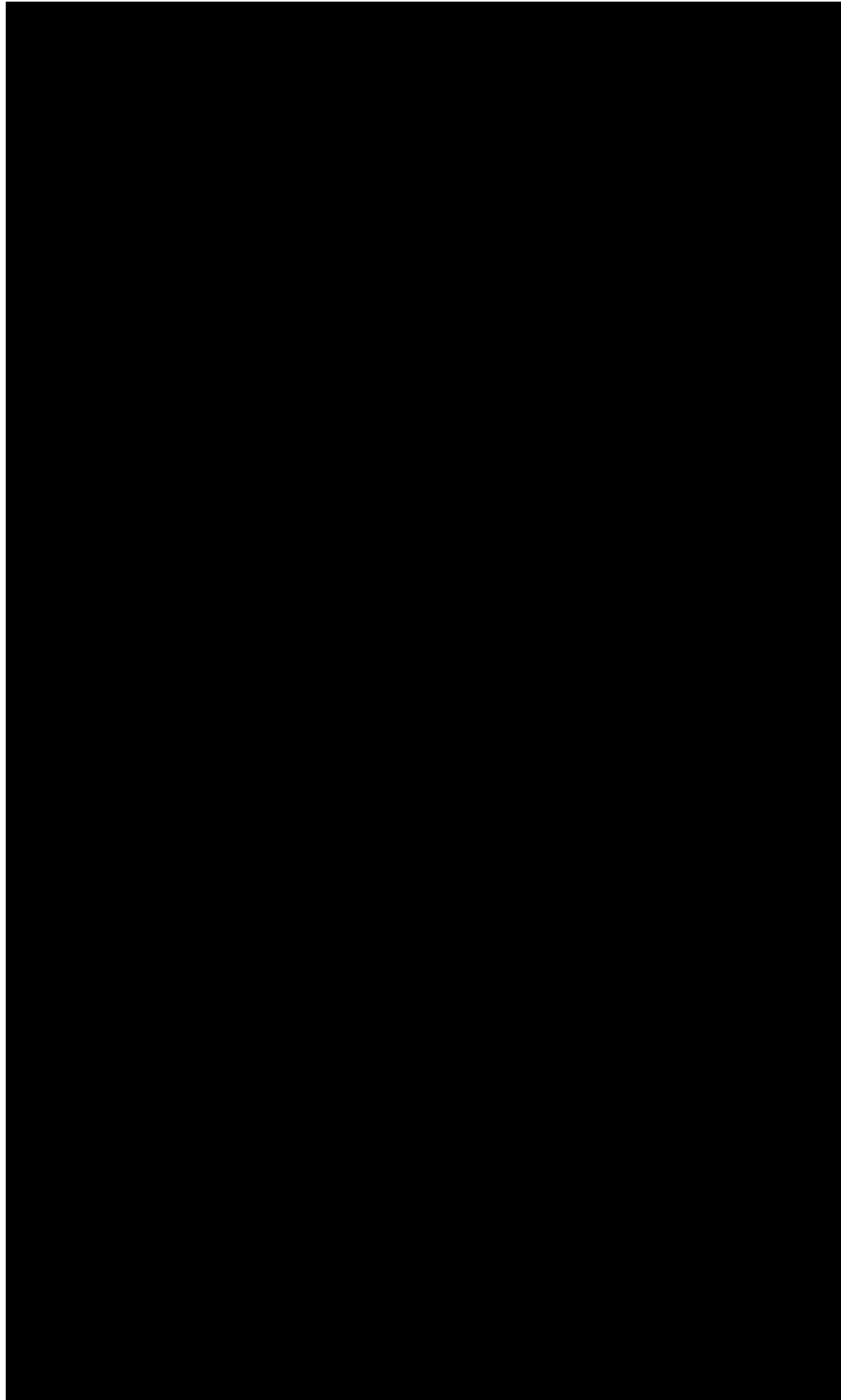
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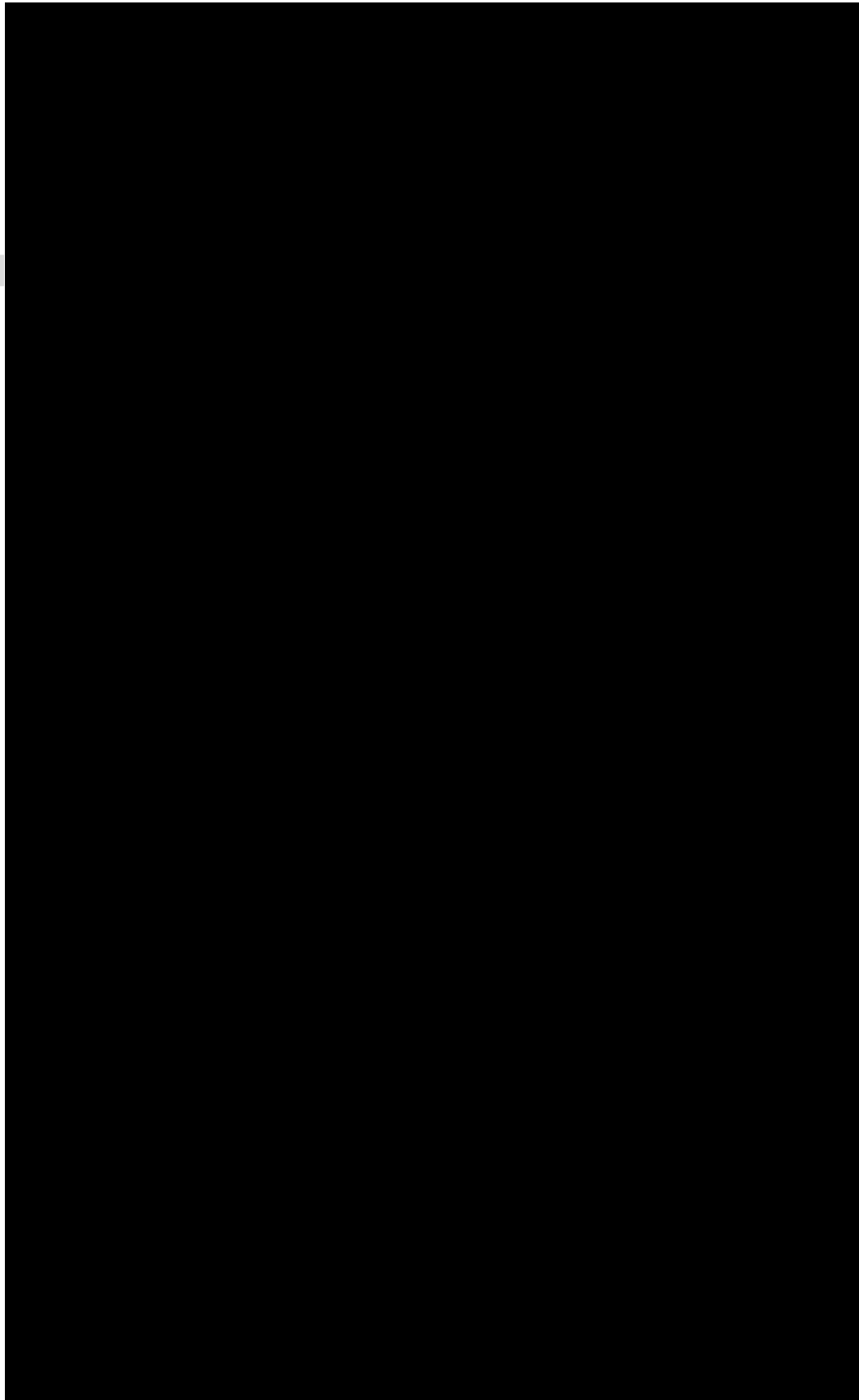
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<b>Total</b>		

*Notes:* See notes in Exhibit J.1.

*Sources:* See sources in Exhibit J.1.

# **Exhibit H2**

## **Public Redacted Version**



**EXHIBIT 4**  
**FILED UNDER SEAL**

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NORTHERN DISTRICT OF CALIFORNIA  
SAN FRANCISCO DIVISION**

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Seattle, WA 98104

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812 Quarrier St., First Floor  
P.O. Box 1789  
Charleston, WV 25326

*Plaintiffs,*

v.

GOOGLE LLC, GOOGLE IRELAND  
LIMITED, GOOGLE COMMERCE  
LIMITED, GOOGLE ASIA PACIFIC  
PTE. LIMITED, GOOGLE PAYMENT  
CORP., and ALPHABET INC.,

*Defendants.*

**Rebuttal Expert Report of Dr. Marc Rysman**

**December 23, 2022**

**NON-PARTY AND PARTY HIGHLY CONFIDENTIAL – OUTSIDE COUNSEL EYES ONLY**



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## **I. Introduction**

1. At the request of the Attorneys General for 39 states, commonwealths, and districts of the United States (hereafter, the “States”), I submitted a report on October 3, 2022, in which I offered opinions on the competitive effects of certain alleged anticompetitive conduct by Google in relation to the Google Play Store and Google Play Billing and quantified damages resulting from this challenged conduct.<sup>1</sup> I described my qualifications in that report, and I include my updated CV as Appendix A to this report.

2. In my Opening Report, I concluded that Google engaged in anticompetitive conduct that caused harm to competition and harmed Android smart mobile device users in the U.S. and worldwide (excluding China). I determined that the markets for Android App Distribution and Android In-App Billing Services worldwide (excluding China) are relevant antitrust markets for evaluating Google’s challenged conduct. I also demonstrated that Google has substantial market power in these markets and that non-Android app stores do not constrain Google’s market power in these markets. I also concluded that Google uses its market power in Android App Distribution to tie the use of its app distribution services to the use of Google Play Billing for in-app digital content purchases on apps distributed through the Google Play Store.

3. On November 18, 2022, Google served reports from seven consultants.<sup>2</sup> Since then, Google has also served a supplemental report and an errata to another report.<sup>3</sup> In this report, I have been asked to evaluate the analyses and opinions put forward by certain of Google’s consultants, particularly Dr. Catherine Tucker, who offered opinions on market definition and

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<sup>1</sup> Expert Report of Dr. Marc Rysman, October 3, 2022 (“Rysman Opening Report” or “my Opening Report”).

<sup>2</sup> Expert Report of Catherine E. Tucker, November 18, 2022 (“Tucker Report”); Expert Report of Matthew Gentzkow, November 18, 2022 (“Gentzkow Report”); Expert Report of Dr. Gregory K. Leonard, November 18, 2022 (“Leonard Report”); Expert Report of Donna L. Hoffman, Ph.D., November 18, 2022 (“Hoffman Report”); Expert Report of Douglas J. Skinner, November 18, 2022 (“Skinner Report”); Expert Report of Sandeep Chatterjee, Ph.D., November 18, 2022 (“Chatterjee Report”); and Expert Report of Zhiyun Qian, November 18, 2022 (“Qian Report”).

<sup>3</sup> Supplement to Initial Expert Report of Matthew Gentzkow, December 7, 2022 (“Gentzkow Supplement”); Expert Report of Dr. Gregory K. Leonard Errata, November 30, 2022 (“Leonard Errata”).

market power; Dr. Matthew Gentzkow, who offered opinions on the competitive effects of Google's challenged conduct; Dr. Gregory Leonard, who offered opinions on damages; and only to the extent relevant to my economic analysis, Dr. Zhiyun Qian and Dr. Sandeep Chatterjee, who offered opinions on certain technical issues. In evaluating the arguments put forward by Google's consultants, I have relied upon the evidence cited in Appendix B of the Rysman Opening Report, as well as additional documents in the record, deposition testimony,<sup>4</sup> evidence presented by Google's consultants, and my review of the backup electronic productions accompanying Google's reports. Appendix B contains a list of new materials that I have relied upon in forming my opinions since my Opening Report.

## II. Summary of Opinions

4. Based on my analyses presented in this report and those summarized in my Opening Report, my review of the reports Google submitted, my continued review of the record evidence, and my experience as an industrial organization economist, it remains my opinion that Google (i) holds market power in two relevant antitrust markets, each of which is pertinent to evaluating the effects of Google's challenged conduct; (ii) engaged in a combined course of anticompetitive conduct through which it restricted competition by imposing barriers in each Android app distribution channel and maintained market power in the market for Android App

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<sup>4</sup> Deposition of Brian Vogelsang, Former Product Manager for Plaza Retail - Qualcomm Incorporated, November 10, 2022 (hereafter "Vogelsang Deposition"); Deposition of James Kolotouros, Vice President, Android Platform Partnerships at Google, February 2-3, 2022 (hereafter "Kolotouros (Google) Deposition"); Deposition of Christopher Dury, CEO at GetJar, September 16, 2022 (hereafter "Dury (GetJar) Deposition"); Deposition of Christian Cramer, Finance Director for Play at Google, January 13-14, 2022 (hereafter "Cramer (Google) Deposition"); Deposition of Lawrence Koh, General Manager and Head of FIFA Mobile at EA and formerly Director and Global Head of Games Business Development at Google, December 9, 2021 (hereafter "Koh (Google) Deposition"); Deposition of George Christopolous, Founder of SlideME, September 9, 2022 (hereafter "Christopolous (SlideME) Deposition"); Deposition of David Kleidermacher, Vice President, Engineering, at Google, February 3-4, 2022 (hereafter "Kleidermacher (Google) Deposition"); Deposition of Aashish Patel, Director of Product Management at NVIDIA, September 29, 2022 (hereafter "Patel (Nvidia) Deposition"); Deposition of Ben Goodger, General Manager, Engineering, Product and Developer Relations at Google, September 7, 2022 (hereafter "Goodger (Google) Deposition"); Deposition of Kaori Miyake, Head of Product Communications, Android and Google Play, November 1, 2022 (hereafter "Miyake (Google) Deposition"); Deposition of Christopher Babcock, Senior Platform Engineer at Epic Games, February 17, 2022 (hereafter "Babcock (Epic) Deposition").

Distribution; (iii) tied the use of Google Play Billing to its app distribution services; and, through this collective challenged conduct, (iv) caused harm to competition and consumers.

5. I find the opinions of Google’s consultants flawed and unconvincing. In particular, Dr. Tucker focuses her analysis on the entire “Android Ecosystem,” which leads her to define an overly broad relevant product market consisting of “facilitation of digital transactions,” a market that is vague and could include transactions that could never be transacted by a retail consumer or on a mobile phone.<sup>5</sup> By contrast, my market definition follows standard practice by beginning with products at issue in this case, the Google Play Store and Google Play Billing, and then identifying the relevant substitutes for those products. I then test whether I have defined the markets in an artificially narrow way and find that I have not. This is the approach suggested by the *U.S. Merger Guidelines*. Dr. Tucker, on the other hand, begins her analysis with the entire Android ecosystem and then insists there are numerous competitive constraints on Google, including Apple, which she claims I have not properly accounted for in assessing market definition. However, even firms with extensive market power can face hypothetical substitutes that nevertheless do not constrain their ability to control price and other transaction terms in their relevant market. In my Opening Report, I concluded that substitution to products outside my proposed markets could not constrain the prices of a hypothetical monopolist in those proposed markets.<sup>6</sup> Nevertheless, I evaluate Dr. Tucker’s evidence regarding these competitive constraints and find they do not alter my opinion regarding the relevant markets at issue.

6. Dr. Tucker also claims that the Android App Distribution and In-App Billing Services product markets should not be studied separately because they are part of the same ecosystem and that, by separating them, I ignore the inter-relationships between the two.<sup>7</sup> However, I explicitly acknowledge the relationships between the two markets: developers and

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<sup>5</sup> Tucker Report, § III.C.

<sup>6</sup> Rysman Opening Report, ¶ 231.

<sup>7</sup> Tucker Report, § III.C.

consumers must first interact in app distribution before developers need in-app billing services. The two products are complements, not substitutes. There is therefore no need to include them together in a single market. Further, I find that Dr. Tucker's assertion that the relevant geographic market should be limited to the United States would not materially change my opinions with respect to Google's market power and the effect of its challenged conduct on competition and consumers.<sup>8</sup>

7. Finally, Dr. Tucker's position that Google lacks market power in the relevant markets suffers several flaws.<sup>9</sup> Her estimated market shares are based on an overly broad market; she overstates the ability of sideloading, pre-installation, and alternative app stores to constrain Google's market power; and her arguments regarding Google's commission, output, and innovation are uninformative because they do not compare Google's actual world commission, output, and innovation with an appropriate competitive benchmark.

8. Dr. Gentzkow presents an analysis of Google's challenged conduct using standards that appear to find no conduct anticompetitive. He claims Google's pricing structure enables it to earn a return on its investment in the Google Play Store and Android ecosystem "while aligning the incentives of users and app developers to create as much value as possible for the platform as a whole,"<sup>10</sup> and presents five factors for evaluating Google's commission rate structure to demonstrate it is "effective."<sup>11</sup> Although Dr. Gentzkow cites my work as support in part of this five-factor test, in fact, Dr. Gentzkow's factors appear designed to fit the way Google has chosen to structure its business.

9. Moreover, even if Dr. Gentzkow were correct that the challenged conduct helped develop the Android ecosystem, his five factor test does not address whether prices are set by competition and is irrelevant to antitrust evaluation. Furthermore, Google's experts provided no

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<sup>8</sup> Tucker Report, § VII.

<sup>9</sup> Tucker Report, § VIII.

<sup>10</sup> Gentzkow Report, ¶ 27.

<sup>11</sup> Gentzkow Report, ¶¶ 144-154.

quantitative analysis to support the conclusions that Google’s challenged conduct helped lower the price for Android smart mobile devices or increased the adoption of the Android OS.

10. In evaluating Google’s challenged conduct, Dr. Gentzkow considers each element of Google’s challenged conduct separately, ignoring the anticompetitive impact of its conduct as a whole. He contends that “availability” of alternative app distribution channels is sufficient to find there is no harm to competition, regardless of the quality or accessibility of these alternatives and despite the fact that Google’s conduct has effectively foreclosed each of these alternatives from obtaining meaningful market share.<sup>12</sup> He speculates – without evidence - that users and developers *could* be worse off in the but-for world if Google changed conduct that is not at issue. That flawed comparison leads to incorrect conclusions. Finally, the limited empirical evidence he does present is inconsistent or incorrect.

11. Dr. Leonard responds to my damages analysis and proposes his pass-through model quantifying overcharge damages to consumers.<sup>13</sup> Dr. Leonard misrepresents my benchmarking method for the but-for commission of 15%. He claims that I have used other mobile app stores and game platforms as benchmarks to estimate a 15% commission in the but-for world.<sup>14</sup> But, in fact, I have used Google’s own reduced commission rates introduced in the last few years and referenced extensively in its own documents as a conservative benchmark showing what Google’s global commission rates would be in the but-for world, which is in line with Dr. Leonard’s approach to benchmarking.

12. Dr. Leonard repeatedly states that my damages model assumes a 100% pass-through rate, which is also incorrect. I illustrated damages estimates using 0% and 100% pass-through rates to show that price and variety trade-off. To be extremely conservative, I calculated harm to consumers in the plaintiff States in the damages period using a 0% pass-through rate. Dr.

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<sup>12</sup> Gentzkow Report, § VI.

<sup>13</sup> Leonard Report, §§ VII, VIII, IX, and XI.

<sup>14</sup> Leonard Report, Table 9.

Leonard's damages quantifications completely ignore any effect of Google's anticompetitive conduct on consumers in the form of lost variety.

13. Dr. Leonard also calls my damages model 'stylized,' claims that it does not account for heterogeneity across apps, and argues that I impose unsupported simplifying assumptions for the sake of analytical tractability. Those claims are incorrect. My model is derived from Church and Gandal (1993), which is a model of monopolistic competition between software developers in choosing a platform on which to publish.<sup>15</sup> A model of monopolistic competition fits the Android App Distribution Market because Android apps are not all perfect substitutes for each other. Thus, the model is heterogenous from the outset, but looks at the Android ecosystem as a large economic system, akin to a trade or macroeconomic model, where economists abstract from issues that are not critical to the goals of the model. And other economists have recently calculated a loss in consumer welfare from a decrease in the number of apps on the Google Play Store. Dr. Leonard also fails to acknowledge the many conservative assumptions that I have made.

14. Finally, Dr. Leonard claims that my damages model does not account for consumer search costs and direct network effects that he claims could reduce consumer welfare in the but-for world. However, he does not provide any evidence that these are indeed concerning for Google. He proposes two adjustments of my model to make his point, neither of which fit the facts of this case. Thus, I find that Dr. Leonard's criticisms are unsupported and do not alter my opinion that consumers were substantially harmed as a result of Google's conduct.

15. Though, in what follows, I put forth significant criticisms of Google's experts' opinions, I think it is helpful to outline some of the significant points upon which we appear to agree. We appear to agree on the following facts (when Google's consultants opined on them):

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<sup>15</sup> See Rysman Opening Report, ¶ 487 (citing to Church, Jeffrey and Neil Gandal. "Complementary network externalities and technological adoption," *International Journal of Industrial Organization*, Vol. 11, No. 2, 1993, pp. 239-260), § IX.A .



- Google’s conduct affects the number of apps in the Android ecosystem.<sup>16</sup>
- Consumers value the variety of apps and in-app content available to them.<sup>17</sup>
- Economics supplies valid methods for determining the number of firms (or in this case the number of apps) that will enter a market.<sup>18</sup>
- Economics offers tools to express in dollars the value that consumers place on variety.<sup>19</sup>
- Google’s own fees and discounts provide valid counterfactual fees for use in conservatively estimating damages, even if we disagree on exactly which of its fees should be used.<sup>20</sup>

While Google’s experts may criticize details of how I implemented my calculations (which, as I discuss below, I do not find to be valid criticisms), there is no dispute about the basic idea that, in general, economics provides valid tools for making these calculations.

16. Finally, reports from Google’s consultants and accompanying exhibits and appendices total approximately 2,700 pages, and their accompanying production, which Google’s experts have provided on a rolling basis, totaled more than 90 GB. Consequently, I do not respond herein to all the details and analyses underlying each of their opinions, but instead I

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<sup>16</sup> Tucker Report, §§ IV.C.3-5; Gentzkow Report, ¶ 85.

<sup>17</sup> Tucker Report, §§ IV.C.5; Gentzkow Report, 138. See, also Jean-Charles Rochet and Jean Tirole, “Platform Competition in Two-Sided Markets,” *Journal of the European Economic Association*, Vol. 1, No. 4, 2003, pp. 990-1029, at pp. 990-991.

<sup>18</sup> See, e.g., Berry, Steven, and Peter Reiss, “Empirical Models of Entry and Market Structure,” Chapter 29, *Handbook of Industrial Organization*, Vol. 3, 2007, pp. 1845-1886, at 1873 - 1877.

<sup>19</sup> See, e.g., Mas-Colell, Andreu, Whinston, Michael D., and Green, Jerry R., “Microeconomic Theory,” Oxford University Press, June 1995 (hereafter “Mas-Colell et al (1995)”), pp. 80-91; Varian, Hal R., “Intermediate Microeconomics: a Modern Approach,” Eighth Edition, New York, NY:W.W. Norton & Company, 2010 (hereafter “Varian (2010)”), pp. 258-262. See also, Hausman, Jerry A., and Leonard, Gregory K., “The Competitive Effects of a New Product Introduction: A Case Study,” *The Journal of Industrial Economics*, Vol. L, No. 3, September 2002, 237-263, p. 237; Petrin, Amil, “Quantifying the Benefits of New Products: The Case of the Minivan,” *Journal of Political Economy*, Vol. 110, No. 4, August 2002, 705-729, p. 705 (computing compensating variation from the introduction of minivans); and Lee, Robin S., “Vertical Integration and Exclusivity in Platform and Two-Sided Markets,” *American Economic Review*, Vol. 103, No. 7, December 2013, 2960-3000, pp. 2965 and 2994 (computing consumer welfare from access to software variety in the context of console video games).

<sup>20</sup> Leonard Report, ¶ 178.

focus on the most substantive criticisms and opinions by Google’s experts. Any lack of response on any particular issue, detail, critique, or opinion by Google’s experts is not, and should not be interpreted as, agreement with those issues, details, critiques, or opinions. I stand by the conclusions of my Opening Report, to which these reports purport to respond. My work is ongoing, and I will continue to review the reports of Google’s consultants and the discovery record to understand the evidence in this case. I reserve the right to supplement and to amend my opinions.

17. The remainder of this report details in greater depth the analyses underlying my opinions. In Sections III and IV, I consider the opinions of Google’s experts on relevant markets and Google’s market power in those markets. In Section V, I consider Google’s experts’ conclusions on whether Google engaged in anticompetitive conduct and caused harm to competition. In Section VI, I evaluate the damages assessment in the Leonard Report. Throughout, I highlight key flaws in Google’s experts’ analyses and findings and explain how their conclusions do not alter my opinions. In Section VII, I conclude.

### **III. Android App Distribution and Android In-App Billing Services are Relevant Antitrust Markets**

#### **A. Overview**

18. In my Opening Report, I determined the relevant antitrust markets for evaluating the effect of Google’s challenged conduct. The first is the market for the distribution of Android apps on Android smart mobile devices worldwide (excluding China) (the “Android App Distribution Market”). I included in this market the Google Play Store, OEM and third-party Android app stores, pre-installation, and sideloading.<sup>21</sup> This is based on my assessment that these are the distribution channels that would be viable substitutes for the Google Play Store in the absence of Google’s challenged conduct.

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<sup>21</sup> Rysman Opening report, ¶ 142 and Exhibit 18.

19. The second is the market for in-app billing services for purchases of digital in-app content through apps on Android smart mobile devices worldwide (excluding China) (the “Android In-App Billing Services Market”).<sup>22</sup> This market includes: (i) Google Play Billing; (ii) billing service systems provided by other Android app stores; (iii) developers’ own billing service systems; and (iv) independent billing service providers.<sup>23</sup> It is my opinion that but for Google’s tying of Google Play Billing to distribution on Google Play, those other in-app billing services would be viable substitutes for Google Play Billing.

20. I presented both empirical and qualitative evidence supporting the existence of these markets. In line with standard economic analysis of relevant markets, I asked whether a hypothetical monopolist of both markets would find it profitable to impose a combined 10% SSNIP (small but significant and non-transitory increase in price) across Android App Distribution and Android In-App Billing Services.<sup>24</sup> I found that the 10% combined SSNIP across both markets would be profitable, and hence the combined market is not subject to any significant constraints, such as the Apple App Store and associated billing services.<sup>25</sup> I also concluded that Android App Distribution and In-App Billing Services are separate and distinct product markets, as the products are complements with separate demand.<sup>26</sup> In addition to the SSNIP analysis, I also found that Android users face high costs if they wish to switch from Android to iOS, and that there is limited switching / substitution between Android and iOS devices.<sup>27</sup> In addition, I found that PCs or gaming consoles are not a substitute for Android App Distribution due to the differences between their apps and OSs, and that substitution between web-based apps and mobile apps is limited.<sup>28</sup>

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<sup>22</sup> Rysman Opening report, ¶ 10.

<sup>23</sup> Rysman Opening report, ¶ 10.

<sup>24</sup> Rysman Opening report, ¶ 11.

<sup>25</sup> Rysman Opening report, ¶ 11.

<sup>26</sup> Rysman Opening report, ¶ 11.

<sup>27</sup> Rysman Opening report, ¶¶ 186 - 191.

<sup>28</sup> Rysman Opening report, ¶¶ 198 - 218.

21. I concluded the relevant geographic market is worldwide excluding China. Given that Android can reach a global audience and developers want to reach as many users as possible, their incentive is to make their apps available globally. In-app billing service providers also offer their services worldwide and could do so absent Google's conduct. I also understand that the Google Play Store and Google Play Billing are unavailable in China.<sup>29</sup> I therefore defined global markets excluding China for both Android App Distribution and In-App Billing Services.<sup>30</sup>

22. Dr. Tucker presents various criticisms of my market definition analysis. Dr. Tucker begins her criticism with a list of app distribution channels, including Apple, that she believes act as competitive constraints in what she determines to be the relevant antitrust market.<sup>31</sup> She takes the position that the relevant product is "facilitation of digital content transactions" and contends that the Android App Distribution and Android In-App Billing Services Markets that I define should be combined and expanded to include the competitive constraints she alleges.<sup>32</sup> Dr. Tucker also claims that the relevant geographic market should be limited to the United States.<sup>33</sup>

23. I have considered Dr. Tucker's criticisms and conclusions, and, as I explain in further detail in the sections below, I find her criticisms to be without merit and find her conclusions inconsistent with the evidence. In particular:

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<sup>29</sup> Gentzkow Report, ¶ 641 ("Government restrictions in China mean users cannot access Google Play and have limited access to Google apps and services."). See "How to Access Google Play Store in China," VPNdada, available at <https://www.vpndada.com/access-google-playstorechina/> ("If you buy an Android phone in China today, you won't find the Google Play app store preinstalled on that phone. Instead, depending on the brand of the phone, it will come with some other app stores, mostly likely one offered by a Chinese company. If you own an Android phone purchased outside of China which has Google Play preinstalled, when you visit China, you will find that you can no longer use it.").

<sup>30</sup> Rysman Opening report, ¶ 12.

<sup>31</sup> Tucker Report, §§ IV and V.

<sup>32</sup> Tucker Report, §§ III.B.1 and VI.C.

<sup>33</sup> Tucker Report, § VII.

- I start out by emphasizing that I have performed a hypothetical monopolist test (HMT), including a quantitative calculation that indicates that a hypothetical monopolist would raise price in the relevant markets by at least a SSNIP. The SSNIP analysis provides a framework for evaluating whether the evidence in this case indicates that my proposed markets need to be expanded to include additional products. Because I found that a hypothetical monopolist would find it profitable to impose a SSNIP, my markets do not need to expand to include Dr. Tucker’s proposed competitive constraints to Google’s market power. I address Dr. Tucker’s criticisms of my SSNIP calculation in Section III.B.
- Dr. Tucker focuses market definition on identifying actual and potential competitors to Google across the Android ecosystem (including smart mobile devices and mobile OSs) rather than on the forces of demand substitution relevant to my proposed markets. As I explained in my Opening Report, “[m]arket definition typically centers on demand-side substitution, evaluating the reasonably interchangeable choices available to consumers, such that they would form a relevant antitrust market.”<sup>34</sup>
- Dr. Tucker falls for the Cellophane Fallacy; she mistakes limited substitution away from Android devices to Apple devices or to other platforms in the actual world, where Google has exercised its market power, for evidence of substitution that would occur in a but-for competitive setting. I review her specific evidence related to this in Sections III.C.1 III.C to 112.
- Dr. Tucker’s claim that dividing Android App Distribution and Android In-App Billing Services into two markets divides “Google’s Android ecosystem ... arbitrarily”<sup>35</sup> is not correct. In fact, by defining two markets, I account for the relationship between the parts of “Google’s Android ecosystem” that are relevant to understanding the challenged

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<sup>34</sup> Rysman Opening Report, ¶ 117 (citing to U.S. Department of Justice and the Federal Trade Commission, “Horizontal Merger Guidelines,” August 19, 2010, available at <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010>, (hereafter, “U.S. Merger Guidelines”), § 4).

<sup>35</sup> Tucker Report, ¶ 32.

conduct. I clarify why it is appropriate to focus on the Android App Distribution and Android In-App Billing Services markets separately, as opposed to the entire Android ecosystem, and address some of her other criticisms of the Android In-App Billing Services market in Section III.D.

- Moreover, as I discuss in more detail in Section III.D.2, I also find that her proposed relevant market is overly broad, “facilitation of digital content transactions.”<sup>36</sup> By attempting to define the relevant product so broadly as to encompass the entire Android ecosystem, Dr. Tucker includes together products that are not substitutes (*e.g.*, distribution of non-Android apps on other mobile OSs, which cannot substitute for the Google Play Store), thereby shifting the focus on market definition away from the demand substitutes for Android App Distribution and the Android In-App Billing Services.
- In Section III.E, I explain that Dr. Tucker’s narrower geographic market that is limited to the U.S., even if it is valid, does not address the evidence of Google’s market power found in its dominance of the worldwide (excluding China) geographic market. I also describe in Section III.E that even assuming a narrower U.S. geographic market, my conclusions regarding Google’s monopoly power from my Opening Report would still hold.

24. I conclude that neither Dr. Tucker’s criticisms of my analysis nor her conclusions with respect to the relevant markets at issue here change my opinion that Android App Distribution and Android In-App Billing Services are relevant antitrust markets for evaluating the effect of Google’s challenged conduct. I review the most salient issues in Dr. Tucker’s analysis below.

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<sup>36</sup> Tucker Report, ¶ 32, *see also* § III.B.1.

**B. My SSNIP Analysis is Robust to Criticism from Google's Consultants**

25. At the outset, it is important to emphasize that, in my Opening Report, I performed a quantitative SSNIP analysis based on published economic literature and the *U.S. Merger Guidelines* as well as using the data available in this case.<sup>37</sup> As explained in my Opening Report, my hypothetical monopolist test accounts for the two-sided nature of the Android App Distribution Market and its relationship with the Android In-App Billing Services Market.<sup>38</sup> Based on my analysis, I found that a hypothetical monopolist would find it profitable to raise price in the Android App Distribution Market.<sup>39</sup>

26. The hypothetical monopolist test analyzes whether a proposed market is too narrow. According to the U.S. Horizontal Merger Guidelines the hypothetical monopolist test starts with products offered by the merging firms and asks whether a hypothetical monopolist of that product could profitably impose a SSNIP.<sup>40</sup> If the candidate product fails the test, then the market is too narrow.<sup>41</sup> But not all potential substitutes should be included, because if the market is defined too broadly it will understate a firm with market powers ability to raise prices or restrict output.<sup>42</sup> In my Opening Report, I applied an economic model grounded in the economic literature, used an elasticity of demand estimate for the Google Play Store from the published economics literature, and used data from Play transactions to model a SSNIP on a hypothetical monopolist of the Google Play Store.<sup>43</sup> My test found that a SSNIP was profitable if the hypothetical monopolist's marginal cost was any value greater than -\$5.54, and since evidence indicates the hypothetical monopolist would face a positive marginal cost, I concluded that the

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<sup>37</sup> Rysman Opening Report, ¶¶ 117-123; U.S. Merger Guidelines, § 4.1.1 & § 4.1.3.

<sup>38</sup> Rysman Opening Report, ¶ 223.

<sup>39</sup> Rysman Opening Report, ¶ 231.

<sup>40</sup> U.S. Horizontal Merger Guidelines, § 4.0 and 4.1.1

<sup>41</sup> U.S. Horizontal Merger Guidelines, § 4.0 and 4.1.1

<sup>42</sup> U.S. Horizontal Merger Guidelines, § 4.1.1.

<sup>43</sup> Rysman Opening Report, ¶¶ 223-225 and Appendix F.



markets do not need to expand to include additional substitutes.<sup>44</sup> However, I also included preloading, sideloading, pre-installation, and other Android app stores in my market definition.<sup>45</sup>

27. From the starting point of the product being “facilitation of digital transactions,” Dr. Tucker points to numerous platforms that she believes are substitutes for the Google Play Store.<sup>46</sup> But this is an error that leads Dr. Tucker to understate market shares. The Guidelines explain that “the relative competitive significance of more distant substitutes is apt to be overstated by their share of sales,” so the economists usually study “the smallest relevant market” in which the hypothetical monopolist can impose a SSNIP.<sup>47</sup> Thus, because I empirically demonstrate that a SSNIP would be profitable for a monopolist of the relevant markets the market is not too narrow, the analysis ends, and there is no reason to consider Dr. Tucker’s proposed substitutes. Dr. Tucker’s inclusion of these substitutes even past the point of a SSNIP leads her to underestimate Google’s market power.

28. Dr. Tucker criticizes the SSNIP analysis for three reasons. First, she claims that it “ignores the relevant economics of the outside good and does not account for the network effects which characterize the outside good. Second, Dr. Tucker argues that my SSNIP does not model the costs incurred by Google to facilitate unpaid transactions.<sup>48</sup> Third, she applies the model for a purpose it was not designed for, calculating what Google’s service rate should be in the actual world, and claims both that “Google could profitably raise the service fee by more than 500%,” and that the hypothetical monopolist would do so.<sup>49</sup> But this is a misapplication of the model used in my SSNIP analysis. Both Dr. Tucker and Dr. Leonard also criticize the estimate of the

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<sup>44</sup> Rysman Opening Report, ¶ 231.

<sup>45</sup> Rysman Opening report, ¶ 142 and Exhibit 18.

<sup>46</sup> See e.g. Tucker Report, §§ IV – V, and below in §§ III.C and III.D.

<sup>47</sup> U.S. Horizontal Merger Guidelines, § 4.1.1

<sup>48</sup> Tucker Report, Appendix H, ¶ 1.

<sup>49</sup> Tucker Report, Appendix H, ¶¶ 2 and 13. She also claims in Appendix H ¶ 3 that the fact that in my SSNIP analysis I considered whether a hypothetical monopolist of both Android App Distribution and Android In-App Billing Services on Android are in one broad market is evidence that the two markets should be combined. I discuss this in § III.D.1 of this report, and in V.C.5 of my Opening Report.

elasticity that I used.<sup>50</sup> I address each of these criticisms below, and explain why in my opinion the combined Android App Distribution and Android In-App Billing Services Market does not include any additional substitutes.<sup>51</sup>

*1. Modeling the Network Effects of the Outside Composite Good is Unnecessary for the SSNIP Analysis*

29. Dr. Tucker’s first criticism is that my SSNIP analysis “ignores the relevant economics of the outside good and does not account for the network effects applying to the outside good.”<sup>52</sup> Specifically, she claims that the composite outside good “includes iOS and gaming platforms” and that my model improperly “does not account for the network effects of these platforms,” such that my SSNIP understates substitution between platforms.<sup>53</sup>

30. First, it is important to note that my model does account for network effects between developers and consumers within the Android App Distribution and Android In-App Billing Services on Android markets,<sup>54</sup> and both developers and consumers respond to a change in the commission and discount rate that the hypothetical monopolist sets.<sup>55</sup> In order to understand Dr. Tucker’s criticism, it is necessary to understand what products make up the “outside good.” As I explained in my Opening Report the Android App Distribution Market contains, “The Google Play Store; other app stores that are available for Android ... OEMs pre-installing their own apps or apps from third party developers on their Android smart mobile devices; and sideloading.” The hypothetical monopolist owns all of these channels, so any substitution outside will be to app stores on other devices or the web, or simply consumers

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<sup>50</sup> Tucker Report, Appendix H ¶ 16. *See* VI.H.3 of this report for a discussion of Leonard’s arguments related to this topic.

<sup>51</sup> Rysman Opening Report, ¶ 231.

<sup>52</sup> Tucker Report, Appendix H, ¶ 10.

<sup>53</sup> Tucker Report, Appendix H, ¶ 10.

<sup>54</sup> Rysman Opening Report, ¶¶ 219-220. Note that as explained in my Opening Report Android In-App Billing Services on Android market is one sided, but in considering whether the market is no broader than the combination of Android In-App Billing Services on Android and Android App Distribution. Rysman Opening Report, ¶¶ 267-270.

<sup>55</sup> Rysman Opening Report, Appendix F §§ II.B.1-2.

choosing not to spend on apps or developers choosing not to offer an app. As explained in my Opening Report, developers and consumers are unlikely to substitute to: app stores on PC's or gaming consoles, web apps, or app stores on other mobile OSs.<sup>56</sup> A portion of the consumer's substitution could be away from purchasing (*e.g.* keeping their money in their savings account or spending it on other goods besides apps), and a portion of the developer's substitution could be away from developing apps. For example, the increase in the average price of an app predicted by my SSNIP calculation is \$0.14.<sup>57</sup> According to Exhibit 21 of my Opening Report, the average price of an iOS device was nearly \$1,000, and the average price of a new Android device was just over \$200. The change in the price of apps due to a SSNIP customers would face is much smaller than if they switched mobile OS by purchasing a new smart mobile device.<sup>58</sup> As explained in my Opening Report, consumers are unlikely to incur the expense necessary to switch devices in the event of a SSNIP on prices charged in the Google Play Store.<sup>59</sup>

31. Second, even assuming the entire decrease in spend from the SSNIP in the Android App Distribution Market were reflected in an equivalent increase in spending on the Apple App Store, that would only represent a small fraction of Apple's annual consumer spending on their App Store. The decreases in spending from the SSNIP predicted by my model is about [REDACTED] over the period from August 16, 2016 through May 31, 2022, which on an annualized basis is about [REDACTED] in 2020.<sup>60</sup> In contrast, in 2020, Dr. Tucker's own source estimates consumer spend on the Apple App Store in the U.S. to be \$21 billion, which is over 500 times larger than \$37 million.<sup>61</sup> Dr. Tucker's claim is that additional spending of this

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<sup>56</sup> Rysman Opening Report, §§ V.C.3. b), d), e), f), g) and h).

<sup>57</sup> Rysman Rebuttal Report Backup Production. This assumes conservatively that passthrough of changes of Google's commission rate to prices faced by consumers is 100%.

<sup>58</sup> Rysman Opening Report, Exhibit 21. *See also* Rysman Opening Report, ¶ 176 indicating estimated switching costs from the academic literature of \$189 and \$510.

<sup>59</sup> Rysman Opening Report, ¶¶ 163-174.

<sup>60</sup> Rysman Rebuttal Report Backup Production. To calculate the annualized figure for 2020, I take the percentage change in spend over the full period from August 16, 2016 through May 31, 2022, and apply that to spend on the Google Play store in 2020.

<sup>61</sup> "2021-2025 Mobile Market Forecast," Sensor Tower, 2021, available at <https://go.sensortower.com/rs/351-RWH-315/images/Sensor-Tower-2021-2025-Market-Forecast.pdf>. \$21 billion is 567 times larger than \$37 million.

magnitude on the Apple App Store would raise network effects on the App Store so much that it would spur further substitution from the Android App Distribution and Android In-App Billing Services markets to a different mobile OS and app store and make the SSNIP unprofitable (which I showed to be profitable for any positive marginal cost). I think it is unlikely that such a small shift in spend relative to existing spend would meaningfully change network effects, because it represents an increase in spend on the Apple App Store of only 0.18%. And that assumes all of the decreased spend would go to the Apple App Store only, and that there would be no reduction in overall app spending as a result of the SSNIP—both of which are unlikely to be true.<sup>62</sup> Given the small substitution away from the Play Store that would arise due to a SSNIP relative to the spend on other platforms and the fact that it would be distributed over numerous options (including simply not purchasing or not developing an app), I do not find it necessary for the purpose of a SSNIP to model network effects within the outside good. As explained further below, Dr. Tucker’s premise for modeling network effects on these other platforms is that “data show that users switch from Android to iOS devices at high rates.”<sup>63</sup> The data I cite in my Opening Report show that such switching levels are low.<sup>64</sup> In any event, evidence of switching in the actual world cannot be used as evidence of switching in the but-for world in the absence of the challenged conduct. Because actual world switching may simply result from Google charging supracompetitive prices, the Cellophane Fallacy infects Dr. Tucker’s principal criticism of my SSNIP.

## 2. *My SSNIP Analysis Results Are Robust to Accounting for Free Apps*

32. Dr. Tucker’s second criticism is that my SSNIP analysis does not account for free apps. Her concern is that “[i]f Google increases the service fee rates of paid app transactions, consumers may respond by increasing usage of free apps on Android and this may increase the

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<sup>62</sup> Dr. Tucker herself claims that in addition to the Apple Appstore, quantity would also be split among “the web, web apps, and gaming platforms.” Although she does not recognize that overall quantity would be reduced, but that is clearly likely. *See* Tucker Report, Appendix H ¶ 10.

<sup>63</sup> Tucker Report, Appendix H ¶ 10.

<sup>64</sup> Rysman Opening Report, § V.C.4.

costs incurred by Google to facilitate unpaid transactions.”<sup>65</sup> Dr. Tucker does not attempt to quantify this point, but it does not change my opinion for several reasons.<sup>66</sup>

33. Dr. Tucker’s concern seems to relate to an increase in the hypothetical monopolist’s costs driven by a SSNIP leading to an increase in free transactions.<sup>67</sup> This concern appears not to be empirically relevant to my SSNIP analysis. There are three ways that usage of free apps could increase as a result of a SSNIP in the hypothetical monopolists commission and discount rates: (i) consumers could observe higher app prices and switch to free apps, (ii) paid apps could switch their monetization strategy and become free, or (iii) paid apps could exit the market which could push transactions from paid to free apps.<sup>68</sup> First, in my SSNIP calculation, I assume passthrough is 100%, but Dr. Leonard finds that passthrough is lower, he suggests 3%; in my variety damages I assume 0% passthrough.<sup>69</sup> If passthrough is lower than 100%, then consumers will not experience much of the price increase and would be less likely to switch to free apps. As I explain below, my SSNIP test is conservative because of this passthrough assumption.<sup>70</sup> Second, many apps are not likely to switch and become free or ad supported in response to a small change in the commission. In Section 112112 below, I show that developers usually choose a single monetization strategy and rarely switch strategies.

34. For the increase in costs due to free transactions to make a SSNIP unprofitable it would need to outweigh the decrease in the cost of paid transactions that would result from the SSNIP. A simple extension of my SSNIP test from the prior report to include costs from free

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<sup>65</sup> Tucker Report, Appendix H ¶ 12.

<sup>66</sup> I note that I used an own-price elasticity estimate for the inside good (that is, an app from the Google Play Store) from the economics literature. I use the estimate in Ghose & Han (2014). Ghose and Han calculated Google Play Store elasticity in a sample that included free apps as well as paid apps. Ghose, Anindya and Sang Pil Han, “Estimating Demand for Mobile Applications in the New Economy,” *Management Science*, Vol. 60, No. 6, 2014, pp. 1470-1488, at 1473 (“The apps in the daily app data consist of both top-400 free apps and top-400 paid apps from each app store.”).

<sup>67</sup> Tucker Report, Appendix H ¶ 12.

<sup>68</sup> To the extent that Google or the hypothetical monopolist incurs fixed costs related to running a platform that facilitates what Dr. Tucker calls “free transactions,” these fixed costs are not relevant to the hypothetical monopolist’s incentive to raise the commission above the competitive level.

<sup>69</sup> Leonard Report, ¶ 79. Rysman Opening Report, ¶ 607.

<sup>70</sup> See § III.B.4 of this report.

transactions results in the following inequality, where if the hypothetical monopolist's marginal cost for paid transactions exceeds the term on the right it would be profitable to raise price by the SSNIP:<sup>71</sup>

$$C_{Paid} > Threshold + C_{Free} * Diversion_{Paid\ to\ Free}$$

35. The term *Threshold* is the same as the marginal cost threshold calculated in my prior report, which was -\$5.54.<sup>72</sup> The new term is the product of the cost of a free transaction and the diversion of transactions from paid to free. To be very conservative, I assume that free transactions increase by the same amount that paid transactions decline, then

$Diversion_{Paid\ to\ Free} = 1$ . Plugging in these two values and re-arranging, gives  $C_{Free} - C_{Paid} < \$5.54$ . In my Opening Report, I provided evidence that the marginal cost of a paid transaction for the hypothetical monopolist is likely positive.<sup>73</sup> If  $C_{Paid}$  is positive,<sup>74</sup> then as long as the cost of a free transaction does not exceed the cost of a paid transaction by more than [REDACTED] the hypothetical monopolist would find it profitable to raise price. If the diversion from paid to free is not 100% then the cost of free transactions could exceed the cost of paid transactions by more than \$5.54 and the hypothetical monopolist would still be willing to raise price.

36. Dr. Tucker does not explain why the variable costs associated with “free transactions” on the Google Play Store would be significant to the hypothetical monopolist (or significantly higher than that for paid transactions). In fact, Google’s P&L data suggests that [REDACTED] is the largest category of variable costs for the Play Store, making up 91% of direct costs in 2021,<sup>75</sup> and presumably payment processing fees are only relevant for paid

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<sup>71</sup> See Appendix C of this report.

<sup>72</sup> Rysman Opening Report, ¶ 230.

<sup>73</sup> Rysman Opening Report, ¶¶ 230-231.

<sup>74</sup> See Rysman Opening Report, ¶ 230.

<sup>75</sup> Google Play P&L Data, GOOG-PLAY-010801682. This calculation excludes [REDACTED], including those costs gives [REDACTED]. See also Google, “Play Finance Overview,” November 2017, GOOG-PLAY-000613152.R-249.R, at 162.R which shows transactions fees and chargeback as [REDACTED] of a dollar spent on the Play store on Apps & Games, and the only other direct cost shown is [REDACTED] which is [REDACTED] of a dollar. Based on this document it appears [REDACTED] may not be relevant to apps and games. Rysman Rebuttal Backup Production.

transactions. Dr. Tucker also does not explain why the incentives of apps that are currently free would change in response to a SSNIP on paid transactions. For these reasons, my conclusions regarding the incentive of the hypothetical monopolist to raise prices by a SSNIP are not affected by so-called “free transactions.”

3. *Dr. Tucker Misapplies My SSNIP Analysis Model to Calculate the Profit Maximizing Commission*

37. Dr. Tucker uses the model that I applied in my SSNIP analysis to try to calculate the commission that Google or the hypothetical monopolist should charge developers.<sup>76</sup> As a result, she claims that my model implies that the hypothetical monopolist could profitably raise the commission to 99% from 15%.<sup>77</sup> By using the model to make predictions about commissions well above what is observed in the data (that Google and Apple both charge a 30% commission or lower for select developers and other Android App Stores also do not charge more than 30%),<sup>78</sup> Dr. Tucker inappropriately extrapolates beyond what the data allows. As I explain below, my model was not developed to calculate the optimal commission for either Google or the hypothetical monopolist and to do so would require considerations that are not necessary for the purpose of a hypothetical monopolist test (to determine whether it would be profitable for a hypothetical monopolist to raise the commission by a SSNIP from the competitive level). Even so, the prediction that a hypothetical monopolist with control over Google Play Store,

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<sup>76</sup> Tucker makes this claim about Google in ¶ 2 of Appendix H, but the calculations that support her claim described in ¶ 13 of Appendix H do not refer to Google, but instead to the hypothetical monopolist.

<sup>77</sup> Dr. Tucker says that my “model predicts that the hypothetical monopolist can profitably raise the service fee rate by more than 500% over the 15% service free rate” I use as the competitive benchmark. Tucker Report, Appendix H, ¶ 13. I do not take this to mean that the hypothetical monopolist could charge a commission of 500%. Rather, Dr. Tucker explains that the service fee rate could be profitable at 99% in my model, which is 500% greater than 15%, but only 300% greater than 30%, Google’s prevailing commission for much of the damages period. Dr. Tucker also points out that at a 99% commission the price of apps would be more than [REDACTED]. Her prediction of a [REDACTED] price is a misapplication of the model for the same reasons I explain this section that using the model to predict Google or the hypothetical monopolist would raise their commission to 99% is not appropriate. Tucker Report, Appendix H ¶ 13. Further, Dr. Tucker presents in Figure 1 of Appendix H in which she claims to display “Relationship Between App/In-app Content Price and Elasticity,” I would like to clarify the terminology: the elasticity that she plots is not the usual elasticity of demand; this parameter represents the response of both consumers and developers in equilibrium to the change in the commission and I refer to it as  $\epsilon_{Q,p}$ .

<sup>78</sup> Rysman Opening Report, Exhibit 69; Tucker Report, Table 2.



sideloading, app pre-installation, and competing Android app stores would raise the commission above the approximately 30% used by Google may not be surprising.

38. There may be other constraints on Google's (or the hypothetical monopolist's) ability to raise the commission above 30%, but these may be less relevant to considering a hypothetical monopolist raising its commission from the competitive but-for commission:

- Dr. Tucker points to the possibility of network effects in the outside good in her criticism of my model.<sup>79</sup> As explained above, the changes in consumer spend and the number of apps predicted by the model after a SSNIP is small, and for the purposes of my SSNIP analysis I did not find it necessary to model these effects. However, Dr. Tucker uses the model to investigate the incentives of the hypothetical monopolist to raise prices by significantly more than a SSNIP (about 560%).<sup>80</sup> Her analysis predicts that the number of apps would fall by over [REDACTED]% to about [REDACTED] from the competitive number of apps.<sup>81</sup> Whereas the change in the number of apps after a SSNIP of 10% is [REDACTED]%.<sup>82</sup> Dr. Tucker's calculation also predicts large changes in consumer spending. After the commission is increased to 99% according to Dr. Tucker's calculation, spending would fall by about [REDACTED] to [REDACTED] from August 2016 to May 2022. The predicted spend of [REDACTED] over August 2016 to May 2022 is [REDACTED]% of the actual consumer spend on the Play Store over the period. On an annualized basis, this is [REDACTED]% of spend on the Apple App Store in 2020 in the U.S.<sup>83</sup> These decreases in spending may be significant in terms of changing the network effects for the outside good which includes the Apple App store. In comparison a SSNIP of 10% leads total spending over the same period to decrease by [REDACTED], which on an annualized basis is [REDACTED]% of spend on the Apple

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<sup>79</sup> Tucker Report, Appendix H ¶ 10.

<sup>80</sup> Tucker Report, Appendix H ¶ 13.

<sup>81</sup> Rysman Rebuttal Backup Production.

<sup>82</sup> Rysman Rebuttal Backup Production.

<sup>83</sup> Rysman Rebuttal Backup Production.

App store in 2020.<sup>84</sup> In fact, the size of the decrease in spending predicted by the model is not proportional to the SSNIP, larger changes have disproportionately larger effects on consumer spend.<sup>85</sup> As discussed above, small changes in price are not likely to lead to any network effects in the outside good that would materially affect my SSNIP analysis. But for larger increases in the commission that lead to large changes in spend, network effects in the outside good may be important to model.

- Moreover, in the actual world there are competitors, like Samsung, with app stores in the Android App Distribution Market. It is not necessary to model the strategic reactions of these competitors in a hypothetical monopolist test (since the hypothetical monopolist controls these stores), however, to understand the incentives of a firm in the actual world to set its commissions one would need to account for these stores (and as discussed above any relevant network effects that might be relevant).

39. Therefore, Dr. Tucker's calculations do not support the claim that Google or the hypothetical monopolist would want to raise the commission rate above 30%. The model I used for my SSNIP analysis was designed to capture the behavior of consumers and developers in the two markets and provide evidence on whether the two markets are a profitable monopoly. The goal of the SSNIP is to test whether a hypothetical monopolist would find it profitable to raise prices by a small amount, what an actual monopolist would do or what a firm with market power in the market has done are separate questions.

#### 4. *My SSNIP Analysis Is Conservative*

40. In this section, I present three sensitivity analyses for the SSNIP analysis in my Opening Report. First, I calculate without using the detailed model of consumer demand and app developer entry and exit what the critical responsiveness of quantity in the Android App

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<sup>84</sup> Rysman Rebuttal Backup Production.

<sup>85</sup> A SSNIP of 100% (changing the commission from 15% to 30%) leads spend to decrease by about \$1.9 billion over the entire period. As the size of the SSNIP (or equivalently the commission) considered by Dr. Tucker increases, consumer spend in the Android App Distribution and Android In-App Billing Service markets decreases. See Rysman Rebuttal Backup Production.

Distribution and Android In-App Billing Services markets would need to be such that if the actual responsiveness is lower than this critical value a SSNIP will be profitable. Second, I investigate the sensitivity of my SSNIP analysis to using the elasticity that I estimated in my regression instead of the elasticity from Ghose and Han (2014). Finally, I investigate what the effect of assuming that passthrough is less than 100% would be on the SSNIP analysis. Based on these calculations, I find that the SSNIP analysis in my Opening Report was conservative.

41. First, I revisit the SSNIP analysis in my Opening Report to examine the incentives of the hypothetical monopolist without relying on a specific model and based on this I find it likely that the hypothetical monopolist would find a SSNIP profitable. The equation for the marginal cost threshold above which the hypothetical monopolist would raise price is:<sup>86</sup>

$$C \geq \frac{\epsilon_{Q,p}(1.1\tau^* - 0.9t_B^*)p^{**} - \frac{[(1.1\tau^* - 0.9t_B^*)p^{**} - (\tau^* - t_B^*)p^*]p^*}{p^{**} - p^*}}{\epsilon_{Q,p}}$$

42. The right-hand side of this inequality is a function of three things, i)  $\epsilon_{Q,p}$  how much the quantity of transactions changes when the average app prices change in response to a change in the commission and the discount rate, ii)  $p^{**}$  and  $p^*$  and therefore the change in price expected given a change in the commission and the discount rate, and iii) the competitive commission and discount rate. Given the same competitive commission and discount rate used in my Opening Report, if I make an assumption about how much  $p^{**}$  will increase after the SSNIP – i.e., if I make an assumption about passthrough, then I can calculate the threshold marginal cost as a function of  $\epsilon_{Q,p}$ . Further, if I estimate Google's marginal cost, then I can calculate a critical value of  $\epsilon_{Q,p}$  such that for any  $\epsilon_{Q,p}$  less than that value the hypothetical monopolist would find it profitable to raise price. Assuming conservatively for the purposes of a 10% SSNIP on the commission that there is 100% passthrough of a change in the commission to app prices, and estimating Google's marginal cost per transaction as [REDACTED] and using that as the marginal cost

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<sup>86</sup> Rysman Opening Report, Appendix F E.15, *see also* ¶ 225.

faced by the hypothetical monopolist, that critical value of  $\epsilon_{Q,p}$  is about [REDACTED].<sup>87</sup> This would mean that the hypothetical monopolist charging a competitive commission would expect an [REDACTED]% [REDACTED] in the quantity of transactions in the relevant markets in response to a 1% change in the average price of in-app content accounting for the responses of consumers and developers to the change.

43. Overall, based on the full set of evidence available in this case, the actual value of  $\epsilon_{Q,p}$  that a hypothetical monopolist would face when considering a SSNIP would be less than the critical value 8.9.<sup>88</sup> This is because the hypothetical monopolist would control the Google Play Store and not face competition from sideloading, pre-installed apps, or alternative Android app stores. Consumers and developers, as discussed elsewhere in this report and in my Opening Report, would be unlikely to substitute to app stores on other mobile devices or other channels of distribution.<sup>89</sup> The fact that Google currently charges a commission of about 30% while facing competition from sideloading, pre-installed apps, or alternative Android app stores indicates that a hypothetical monopolist would be able to raise its commission above a much lower competitive rate of 15%. Put another way, if the actual responsiveness of transactions to a change in app

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<sup>87</sup> I estimate for the purpose of this sensitivity Google's marginal cost to be [REDACTED] by using Google's calculation that U.S. transaction fees as a percent of consumer spend on the Play store is [REDACTED]% (see Google, "Project Everest – Potential Evolutions," July 2, 2021, GOOG-PLAY-007819776-064, at 861), and multiplying this by total consumer spend in 2021 calculated from the Google Transactions data. This estimate excludes chargebacks which would increase the estimated marginal cost. Another source estimates that in 2014, "Google Play's effective rate for payments" was [REDACTED]% in the U.S., which would provide an estimate of Google's marginal cost of [REDACTED] using the same method (see Google, "Play Cost of Payments," September 9, 2014, GOOG-PLAY-003764714.R-746.R, at 715.R-720.R.) If the sensitivity of app price to the commission is lower or the actual marginal cost is higher, then this critical threshold of  $\epsilon_{Q,p}$  will be larger making it more likely a SSNIP will be profitable. See Rysman Rebuttal Report Backup Production.

<sup>88</sup> See Rysman Opening Report, § V.C. and V.D on market definition.

<sup>89</sup> See III.C of this report. See also Rysman Opening Report § V.

prices was not less than 8.9 this calculation indicates that the hypothetical monopolist would likely not be willing to raise its commission to the level that Google actually has charged.<sup>90</sup>

44. Dr. Tucker also states that instead of relying on the estimate of price elasticity of demand of 1.736 from my regressions, I used an estimate of price elasticity that was “twice as large” from Ghose and Han (2014), 3.731.<sup>91</sup> If Dr. Tucker is suggesting that I should use 1.736 in my SSNIP calculation, then she does not understand my model. Using the higher elasticity is conservative, because it implies that consumers value variety and spending on the on apps less than at the lower elasticity (they are more willing to substitute). Re-calculating the marginal cost threshold that I calculated in my Opening Report of -\$5.54, using the estimated price elasticity of demand from my regressions gives a new lower threshold of -\$6.17.<sup>92</sup> This implies that for an even wider range of values for the hypothetical monopolist’s marginal cost (*i.e.* any value greater than -\$6.17 instead of -\$5.54) than I calculated in my Opening Report, the hypothetical monopolist would find a SSNIP profitable.

45. Dr. Leonard claims that the sensitivity of app prices to Google’s commission is less than 100%.<sup>93</sup> As with my damages model, my SSNIP calculation is flexible enough to accommodate alternative passthrough rates.<sup>94</sup> However, using a lower sensitivity has the effect of increasing the incentive of the hypothetical monopolist to raise prices above the but-for competitive level because consumers will not feel the full effect of the change. To demonstrate that it is conservative for my SSNIP calculation to assume 100% sensitivity of prices to the commission, I have re-calculated the marginal cost threshold that I calculated in my Opening Report of -\$5.54, using the level of sensitivity suggested by Dr. Leonard of 3% and got a new

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<sup>90</sup> In fact, if the responsiveness of quantity to price  $\epsilon_{Q,p}$  is greater than about 3.5 the hypothetical monopolist would not be willing to raise the commission from the but-for competitive values to the actual world values that Google charges. However, as long as the actual  $\epsilon_{Q,p}$  is less than 8.9 the hypothetical monopolist would find a SSNIP profitable (under the assumptions described above for the hypothetical monopolist’s marginal cost and the passthrough rate). *See* Rysman Rebuttal Report Backup Production.

<sup>91</sup> Tucker Report, Appendix H ¶ 16.

<sup>92</sup> Rysman Rebuttal Report Backup Production.

<sup>93</sup> *See e.g.* Leonard Report, ¶ 79.

<sup>94</sup> Rysman Opening Report, ¶¶ 605-607.

lower threshold of -\$58.34.<sup>95</sup> I also re-calculated the threshold using Dr. Singer's estimate that the sensitivity is 91% and got a new lower threshold of -\$6.15.<sup>96</sup> These figures imply that for an even wider range of values for the hypothetical monopolist's marginal cost (*e.g.* any value greater than -\$58.34 instead of -\$5.54) than I calculated in my Opening Report, the hypothetical monopolist would find a SSNIP profitable.

5. *Dr. Tucker's Criticisms of My Regression Analysis Are Overstated*

46. Dr. Tucker criticizes the regression model that I use to provide evidence about the likely size of apps' own price elasticity of demand.<sup>97</sup> This elasticity is used in the calculation of the welfare effects through increased varieties, total welfare effects, and associated damages.<sup>98</sup> Dr. Tucker makes two criticisms: i) that because taxes are not salient, my instrument may understate elasticity of demand, and ii) that my use of data aggregated across states is not appropriate.<sup>99</sup> I address these criticisms more directly below, but regardless of Dr. Tucker's criticisms of my regression, in fact I use the own price elasticity of demand estimated by Ghose and Han (2014), which, as I explain below, corroborates my findings and uses alternative methods that avoid Dr. Tucker's criticisms.

47. My regression model that estimates the own-price elasticity is a regression of the log of the quantity of items (apps or in-app content) purchased on the log of prices, in which I control for app, time, and app purchase type.<sup>100</sup> A standard regression may be problematic because prices are endogenous, and this can be corrected for using an instrumental variable regression.<sup>101</sup> Prices are endogenous in this setting to the extent that there are factors not included in the controls that would affect the quantity of the app or in-app content consumed by

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<sup>95</sup> Leonard Report, ¶ 79. Rysman Rebuttal Report Backup Production.

<sup>96</sup> Leonard Report, ¶ 79. Rysman Rebuttal Report Backup Production

<sup>97</sup> Tucker Report, Appendix F.

<sup>98</sup> Rysman Opening Report, ¶ 576.

<sup>99</sup> Tucker Report, Appendix F ¶ 6 & ¶ 12.

<sup>100</sup> Rysman Opening Report, ¶ 576.

<sup>101</sup> Rysman Opening Report, ¶ 576 and sources cited therein.

users, and correlate with the price set by the developer for their app or in-app content. To address this issue, instrumental variables regression requires identifying a variable that shifts the price that users face but does not affect the quantity consumed by users except through its effect on price. In my Opening Report, I used the tax rate as the instrument for price because it will affect the quantity that consumers purchase only through the price they pay after tax.

48. Dr. Tucker claims that because tax rates are not “salient” using the tax rate as an instrument may understate elasticity of demand.<sup>102</sup> Taxes are not salient when consumers do not fully incorporate the tax into their decision making when deciding whether or not to purchase an item. Dr. Tucker cites to a Google page to support the statement that “In the context of app purchases, as with other sales taxes in the United States, tax rates are not salient because they are not included on the price tag,” but to the contrary this Google page states “You’ll always see tax that will be charged on the checkout screen before completing your purchase. The way Google Play calculates and handles tax depends on the type of content.”<sup>103</sup>

49. Dr. Tucker provides an example of purchasing Robux (a virtual currency for in-app items) from Roblox using Google Play.<sup>104</sup> She states that if she purchased \$4.99 of Robux she “would not actually know that it is going to really cost me \$5.30 (including taxes) at the point I pressed the buy button.” However, as shown in Exhibit 1, the information on the tax is just a single tap away (clicking on the “+ tax” in the red box leads from the page on the left to the page on the right).

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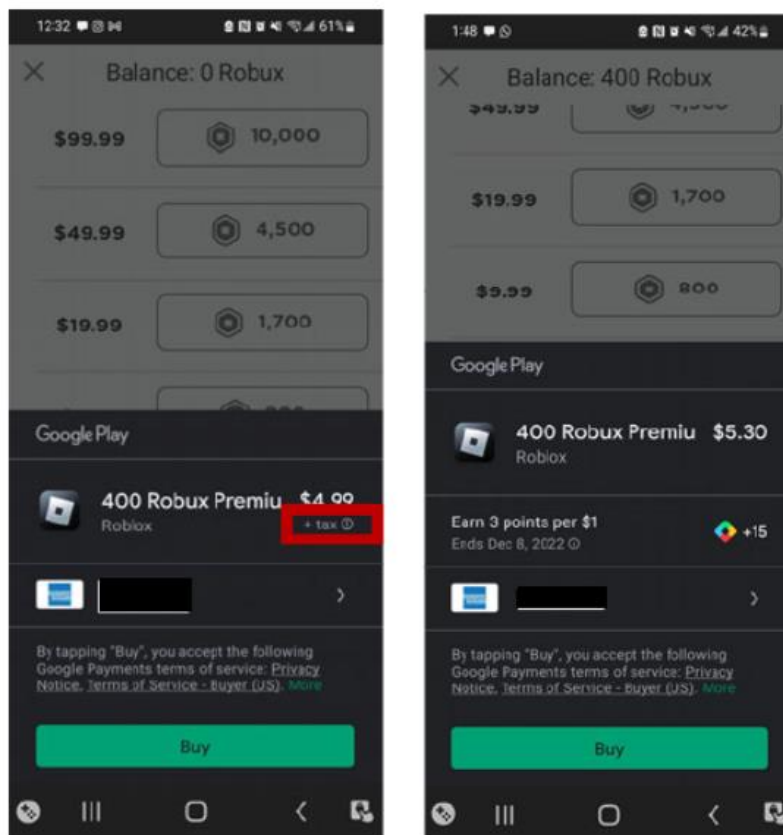
<sup>102</sup> Tucker Report, Appendix F ¶ 6. Her point about the salience of the tax rate is not about whether the instrument solves the classic endogeneity concern in demand estimation that prices are endogenous because of common factors shifting supply and demand. Rather it is about exactly what the instrument identifies. In the spirit of the local average treatment effect, the estimate resulting from a valid instrument still depends on how responsive agents are to the instrument. See Angrist, Joshua D. and Guido W. Imbens, “Identification and Estimation of Local Average Treatment Effects,” *Econometrica*, Vol. 62, No. 2, March 1994, pp. 467-475 at p. 470 (“The local average treatment effect is analogous to a regression coefficient estimated linear models with individual effects using panel data. In models with fixed effects, the data are only informative about the impact of binary regressors on individuals for whom the value of the regressor changes over the period of observation. Under Theorem 1 the treatment effect identified is an average for those who can be induced to change participation status by a change in the instrument.”)

<sup>103</sup> Google, “Tax information for Google Play purchases,” available at <https://support.google.com/googleplay/answer/2850368>.

<sup>104</sup> Tucker Report, Appendix F ¶ 10 and Figure 1.



**Exhibit 1**  
**Tax Information When Purchasing Robux**



50. Dr. Tucker also quotes from the academic literature to claim that taxes are not salient.<sup>105</sup> The paper from which this claim originates studies the salience of taxes in a grocery store and for beer consumption and finds evidence that consumers in the U.S. do not perfectly account for sales taxes.<sup>106</sup> However, it is possible that in the setting of the Play Store taxes may

<sup>105</sup> Tucker Report, Appendix F ¶ 9 citing to Zoutman et al. (2018) who are in turn citing to Chetty, Looney, and Kroft (2009).

<sup>106</sup> Chetty, Raj, Adam Looney, and Kory Kroft, “Salience and Taxation: Theory and Evidence,” *American Economic Review*, no. 99, 2009, pp. 1145-1177, at p. 1145 and 1146. (“First, using a field experiment in a grocery store, we find that posting tax-inclusive price tags reduces demand by 8 percent. Second, increases in taxes included in posted prices reduce alcohol consumption more than increases in taxes applied at the register;” “Exploiting state-level changes in these two tax rates between 1970 and 2003 coupled with annual data on total beer consumption by state, we find that increase in the excise tax reduce beer consumption by an order of magnitude more than similar increases in the sales tax.”)

be more salient than in grocery stores or for beer purchases. The Google Play interface reminds consumers that there is a tax that they should account for on their purchase, while they still have complete freedom to abandon the transaction.

51. Regardless, the use of the tax rates provides an estimate of the elasticity of demand of 1.736 is not dissimilar to what Ghose and Han (2014) estimate of 3.731, and this consistency shows that the instrument I used is working as expected. Ghose and Han use a different set of instruments (*i.e.* not the sales tax rate) that are standard in the industrial organization literature, but which rely on the ability to observe in the data different information about the apps than was used for my regression.<sup>107</sup> Even if Dr. Tucker is correct that because taxes may not be perfectly salient “the resulting estimate of the price elasticity of demand will appear less elastic,”<sup>108</sup> I conservatively use the estimate of the elasticity from the published academic literature that is not subject to her criticisms in my SSNIP analysis and damages calculation.<sup>109</sup>

52. Dr. Tucker also claims that my use of data aggregated across states is problematic.<sup>110</sup> She says this is because “changes in the composition of purchases across states would wrongfully introduce variation in prices and tax rates; in the presence of varied state tax policies, shifts in demand across states would wrongfully be interpreted as shifts in tax rates even when tax rates did not, in fact, change.” Aggregation across states is conceptually appropriate in this setting because prices are set by apps at the national level and do not vary by state.

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<sup>107</sup> Ghose and Han (2014) at p. 1478 & 1479 (“Specifically, following BLP, we use the observed app characteristics (excluding price), the sums of the values of the same characteristics of apps offered by the same app developer, and the sums of the values of the same characteristics of apps offered by other app developers;” “Second, we use the average price of the same-category apps by the “same app developer” in the other app store and the price of the same app by the “same app developer” in the other app store as instruments for price. This approach is similar in spirit to Hausman’s (1997) approach.”). *See* Berry, S., J. Levinsohn, and A. Pakes, “Automobile prices in market equilibrium,” *Econometrica*, Vol. 63, No. 4, July 1995, pp. 841–890 (hereafter “BLP (1995)”), pp. 861; Hausman, Jerry, “Valuation of New Goods under Perfect and Imperfect Competition,” in *The Economics of New Goods*, Ed. Timothy F. Bresnahan and Robert J. Gordon National Bureau of Economic Research and the *University of Chicago Press*, 1996, pp. 207-248, at 219.

<sup>108</sup> Tucker Report, Appendix F ¶ 9.

<sup>109</sup> Rysman Opening Report, ¶ 580 and Appendix F ¶ 77.

<sup>110</sup> Tucker Report, Appendix F ¶ 15.

Aggregation is also standard in the economics literature and has been done in many applications.<sup>111</sup> Further, the regression includes app and month fixed effects, so these shifts in spend across states would need to be within the same app overtime and specific to the app such that they are not captured by controlling for the month. This would be particularly problematic if apps engaged in marketing campaigns aimed at only some states and not others, but Dr. Tucker does not provide evidence of this being empirically relevant.<sup>112</sup> Even if Dr. Tucker's concern has some merit, as noted above, I conservatively use the estimate of the elasticity from the literature in my damages and SSNIP calculations.

53. It is notable that although Google experts criticize my estimates of the elasticity of demand for apps, they do not provide any evidence of their own on this important issue. The fact that Google experts provide no evidence that elasticity is higher than the numbers I use, which are corroborated in the literature, and this contributes to my confidence in my results.

### **C. Dr. Tucker's Purported Competing Platforms Do Not Constrain the Hypothetical Android App Distribution Monopolist**

54. Before addressing Dr. Tucker's specific criticisms, it is helpful to review the role of a quantitative SSNIP analysis in implementing the hypothetical monopolist test. As I noted in my Opening Report, the *U.S. Merger Guidelines* are clear that, even when the evidence is not available to perform the test quantitatively, the conceptual framework of the hypothetical monopolist test can still be used for market definition.<sup>113</sup> If I had been unable for some reason

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<sup>111</sup> Hendry, David F., "The Methodology of Empirical Econometric Modeling: Applied Econometrics Through the Looking-Glass," in *Palgrave Handbook of Econometrics, Volume 2, Applied Econometrics*, Eds. T.C. Mills et al, pp. 4-57, at p. 22 ("Almost all economic data are aggregated in some way, implicitly discarding the disaggregates"). For mainstream demand estimation research using aggregate data, *see* Deaton, Angus and John Muellbauer, "An Almost Ideal Demand System," *The American Economic Review*, June 1980, Vol. 70, No. 3, pp 312-326; and BLP (1995).

<sup>112</sup> Note that app prices appear to be set at the country level. Google, "Set up your app's prices," available at [https://support.google.com/googleplay/android-developer/answer/6334373?hl=en#:~:text=How%20to%20Set%20Up%20Pricing%20for%20a%20Paid,base%20for%20calculating%20market-specific%20prices.%20...%20See%20More](https://support.google.com/googleplay/android-developer/answer/6334373?hl=en#:~:text=How%20to%20Set%20Up%20Pricing%20for%20a%20Paid,base%20for%20calculating%20market-specific%20prices.%20...%20See%20More.). ("You can set your app as free or paid, update your app's pricing universally or per country, and use pricing templates to simplify pricing for your apps in Play Console.").

<sup>113</sup> Rysman Opening Report, ¶ 121 citing to *U.S. Merger Guidelines*, § 4.1.3.

(e.g., data limitations) to perform a quantitative SSNIP analysis as part of the hypothetical monopolist test, I would still have reached the conclusion that Android App Distribution and Android In-App Billing Services are relevant antitrust markets based on the evidence available in this case, which I presented in my Opening Report.<sup>114</sup> Moreover, economists do not view market definition as necessary to establishing market power if direct evidence of market power is available, as it is in this case.<sup>115</sup> I discuss the problems with Dr. Tucker's own qualitative analysis below.

*1. Dr. Tucker's Analysis of Apple and Google Fails to Show Apple Constrains Google in the Relevant Market*

55. Dr. Tucker argues that the relevant market should reflect competitive constraints imposed by Apple on Google.<sup>116</sup> Dr. Tucker's conclusion relies on evidence including:

- The claimed relative ease of switching between Apple and Android;<sup>117</sup>
- Documents, testimony, and marketing material she interprets incorrectly as showing the Android and iOS ecosystems compete;<sup>118</sup>
- Data she claims shows switching by users between Android and iOS;<sup>119</sup>
- The claimed similarity in price and features between the Apple App Store and Google Play Store;<sup>120</sup> and
- The claim that Apple and Google compete to attract developers.<sup>121</sup>

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<sup>114</sup> Rysman Opening Report, V.C.1-4, V.C.6., and V.D.

<sup>115</sup> On the necessity of market definition, *see* references in Rysman Opening Report, footnote 292. I discuss direct evidence of Google's market power in Rysman Opening Report, §§ VI.A.1- 2 and VI.C.1.

<sup>116</sup> Tucker Report, § IV.

<sup>117</sup> Tucker Report, § IV.A.4.

<sup>118</sup> Tucker Report, §§ IV.A.1-IV.A.2.

<sup>119</sup> Tucker Report, § IV.A.3.

<sup>120</sup> Tucker Report, §§ IV.C.1-IV.C.2.

<sup>121</sup> Tucker Report, § IV.C.3.

56. However, Dr. Tucker's evidence falls short of showing users would substitute in significant numbers if a hypothetical monopolist imposed a SSNIP on the relevant market. Dr. Tucker also ignores important lessons from the Cellophane Fallacy and fails to consider whether substitution (or indicators of competition) between Apple and Google is a sign of competition or a profit-maximizing monopolist raising price (or degrading quality) to a point where even inferior goods become substitutes. I also note that Dr. Gentzkow's evidence on Android and iOS pricing corroborates my opinion that the Apple App Store does not constrain the Google Play Store. I discuss each of these main pieces of evidence in detail in the sections below.

a) Evidence of User Switching and Multi-homing between Android and iOS Does Not Indicate Apple Participates in the Relevant Markets

57. As explained above, Dr. Tucker incorrectly views transactions on Apple's iOS as belonging in the relevant antitrust markets for this case. She presents evidence related to Google and Apple's marketing efforts to get consumers to switch between Android and iOS devices, as well as some empirical evidence of switching to support her claim. I address this evidence in sequence below. Overall, I find this evidence does not show that Apple is in the relevant market, and it falls short of showing that Apple constrains Google's market power in Android App Distribution and Android In-App Billing Services.

58. Dr. Tucker provides a number of different data points related to switching between Android and iOS. Before I address some of these in detail, there are three critical problems with her switching analysis.

59. First, Dr. Tucker's analysis of switching is relevant to, at most, one side of the two-sided Android App Distribution Market I propose. Evidence of consumers switching between Apple and Android smart mobile devices says very little about whether developers switch between the platforms in the same way. In other words, because Android and Apple users of smart mobile devices tend not to overlap, and because the developer's incentives are to maximize profits, the developer is incentivized to offer an Android app and an iOS app, provided

that the engineering costs of offering both are lower than the expected revenues from doing so.<sup>122</sup> Participating in multiple platforms is known as multi-homing. Because developers are incentivized to multi-home, they do not switch between serving Android and iOS users; because, even if those users switch, the users tend to single-home with one smart mobile device. If developers want to reach those consumers, they must produce an app for that OS. There is no alternative method to reach those consumers. If users were willing to switch ecosystems in response to changes in the price of apps, then developers who have developed apps on both platforms might be able to steer them to iOS or Android and avoid the costs of developing for both platforms. I have not found evidence that developers do this, and Dr. Tucker proposes none.

60. Second the level of switching between Apple and Android smart mobile devices is, at best, only indirectly relevant to the Android App Distribution Market. Users can switch between ecosystems for all kinds of reasons independent from the price or variety of apps, but the relevant question is whether users would switch between Apple and Android devices in sufficient numbers *in response to a SSNIP by a hypothetical monopolist* in the Android App Distribution Market or the Android In-App Billing Services Market.<sup>123</sup> Dr. Tucker's evidence

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<sup>122</sup> Rysman Opening Report, ¶¶ 45-46.

<sup>123</sup> Dr. Tucker appears to agree: "The relevant question for determining whether the Apple App Store acts as a competitive constraint on the Google Play Store is not whether a substantial number of users switch to iOS devices. Rather, the question is whether a substantial number of users would switch to iOS if the price of the Google Play store increased or its quality decreased relative to the price or quality that would prevail absent monopoly power. Given that the Google Play store is free for most users, it is important to consider whether a substantial number of users would switch to iOS if the Google Play store fell behind the Apple App Store in providing a quality experience for users because Google cut back on efforts to keep the Google Play store competitive. If the answer is yes, then Google has strong incentives to invest in keeping the Google Play store competitive with the Apple App Store, indicating that the Apple App Store acts as a competitive constraint on the Google Play store." What Dr. Tucker fails to recognize is that, for the purposes of market definition, what is relevant is a change in quality equivalent to a small (typically 5% to 10%) change in the commission and discount rate offered by a hypothetical monopolist in the relevant markets. Tucker Report, ¶ 172.

that users switch smart mobile devices to use different app stores,<sup>124</sup> such as users who choose to multi-home (*i.e.*, own both types of devices), is limited.

61. Third, Dr. Tucker falls victim to the well-known Cellophane fallacy. As explained in my Opening Report, the Cellophane fallacy is where a profit-maximizing monopolist may have already increased the price to a point where even goods that would normally be distant substitutes (that would be outside a relevant market under competitive conditions) become substitutes.<sup>125</sup> The genesis of the “Cellophane fallacy” is a case where DuPont (the sole manufacturer of cellophane) increased the price of cellophane to a point where other flexible wrapping materials (*e.g.*, aluminum foil) became substitutes. DuPont argued that this substitution / switching resulting from a SSNIP proved these inferior goods were in the market, but DuPont’s analysis did not conduct the SSNIP at the competitive level. Instead, it used the prevailing (potentially anticompetitive) market price, and therefore risked defining the market too broadly to be useful.

62. Dr. Tucker’s analysis similarly risks defining the market too broadly to be useful by just *assuming* that marginal substitution toward Apple and competition from other Android app stores are equivalent so far as Google is concerned – which is also her conclusion. But I have performed an economic analysis that shows that this proposition is wrong, which is unsurprising because it ignores the basic differences between a developer or consumer choosing iOS and choosing a competing Android app store. The fact that some marginal substitution to iOS occurs in a world in which Google has virtually complete control of Android app distribution is, standing alone, uninformative, because some substitution can still happen at the monopoly price or at quality or variety below the competitive level. Dr. Tucker has not established that this

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<sup>124</sup> For example, Dr. Tucker describes Android’s share decreasing while iOS’s share has increased recently as evidence of switching, but she does not explain why these changes in overall shares in a different market are evidence users would switch to iOS in response to a small price increase in Android App Distribution or In-App Billing Services. She also describes competition for new users but provides no analysis of the features on which new users base their phone choice; whether they choose based on the perceived price or quality of Android App Distribution and In-App Billing Services, or other features. *See* Tucker Report, ¶¶ 165-166.

<sup>125</sup> Rysman Opening Report, ¶ 119 and footnote 297. *See*, also “Appeal from the United States District Court for the District of Delaware,” *United States v. E.I. du Pont de Nemours & Co.*, Case No. 351 U.S. 377, 1956.



substitution is due to app store pricing and, as I have discussed elsewhere, there is good reason to think it is not. However, to the extent it does, evidence of substitution from Google and to Apple may be nothing more than substitution away from monopoly-level quality-adjusted Google prices.

63. I now turn to showing that Dr. Tucker's empirical analysis of switching rates does not suggest Apple participates in the relevant markets.

64. First, Dr. Tucker presents survey evidence that show that "[i]n 2021, 48% of Android smartphone users in the United States owned a tablet, and of those, 59% owned a non-Android tablet. Among Android smartphone users in the United States who owned a tablet, 23%, or around 13.9 million people, owned an iPad."<sup>126</sup> Dr. Tucker then argues that "users can choose whether to purchase digital content in the Apple App Store on their iPad and use it on their Android smartphone or purchase digital content via the Google Play store on their Android smartphone and use it on their iPad, creating direct competition between the two stores and ecosystems." But as a percentage of all Android smart mobile device users, her statistics imply only 11% ( $= 23\% * 48\%$ ) own an iPad, which is consistent with my findings in my Opening Report. Dr. Tucker also does not provide any evidence that users are systematically using an iPad to purchase digital content that they then use on their Android smart mobile device or would be willing to do so in sufficient manner to constrain a hypothetical monopolist or Google. There is evidence that people use their iPad for different purposes than their Android smart mobile device.<sup>127</sup> Furthermore, even if they are purchasing on one device to use on the other, Dr. Tucker does not address whether the 11% of Android users with an iPad is significant enough to provide a sufficient competitive constraint on the hypothetical monopolist.

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<sup>126</sup> Tucker Report, ¶ 164.

<sup>127</sup> See e.g., Google, "Understanding Tablet Users," November 2016, GOOG-PLAY-000092281.R-330.R at 286.R ("Many tablet users make use of their devices at the same time each day, often in the same location each time. Unlike a phone, tablet use is very predictable and is typically for relaxation/ fun. ... Relationships with tablets vs. phones are very different. Screen size and connectivity give these devices different purposes for users;" at 305.R "The larger screen size of tablets makes them preferred to phones for any activity that requires concentration or could result in eye strain, such as reading or watching movies;" and at 307.R "Many essential messaging, banking, and navigation apps are used only on phone, while entertainment apps are used only on tablet.").

65. Dr. Tucker's evidence also implies that about 41% of Android users that own a tablet have an Android tablet.<sup>128</sup> Google has also found that [REDACTED]

[REDACTED]<sup>129</sup> Taken together this means that, for the 41% of users who own an Android Tablet, they may be [REDACTED]% less likely to switch to a different smartphone OS than other users. The presence of users who may not be willing to switch is further evidence that, for app developers, iOS and Android are complements rather than substitutes. Therefore, including iOS in the relevant markets would not be appropriate.<sup>130</sup>

66. Second, in my Opening Report, I showed that 80% of users only have one smartphone.<sup>131</sup> Dr. Tucker's evidence that some users multi-home by purchasing an Android smartphone and an iPad does not address this tendency by consumers to single-home when it comes to their smartphone. Because users tend to use tablets for different purposes than they use their smartphones,<sup>132</sup> developers have incentives to reach Android users on their smartphone even if they own a tablet (including a non-Android tablet such as an iPad).

67. Third, Dr. Tucker presents several different switching rates between iOS and Android in Table 2 and Table 8 of her report. These switching rates are not dissimilar to the rates cited in my Opening Report and do not materially alter my opinions for the reasons stated above. For example, Google found that Android had [REDACTED]% OS adherence in 2016, and [REDACTED]% OS

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<sup>128</sup> According to Dr. Tucker, "of Android smartphone users in the United States that owned a tablet, ..., 59% owned a non-Android tablet" so about 41% own an Android tablet. *See* Tucker Report, ¶ 164.

<sup>129</sup> Rysman Opening Report, ¶ 170 (citing to Google, "US Android -> iOS Switchers Analysis," September 2020, GOOG-PLAY-011640881-906, at 882.) *See* Rysman Opening Report ¶¶ 160-174, for additional discussion of users being locked into an ecosystem.

<sup>130</sup> Rysman Opening Report, § V.C.4.

<sup>131</sup> Rysman Opening Report, ¶ 330 (citing to CMA Final Report on Mobile Ecosystems, ¶ 3.39 and footnote 85).

<sup>132</sup> *See e.g.*, Google, "Understanding Tablet Users," November 2016, GOOG-PLAY-000092281.R-330.R at 286.R ("Many tablet users make use of their devices at the same time each day, often in the same location each time. Unlike a phone, tablet use is very predictable and is typically for relaxation/ fun. ... Relationships with tablets vs. phones are very different. Screen size and connectivity give these devices different purposes for users;" and at 305.R "The larger screen size of tablets makes them preferred to phones for any activity that requires concentration or could result in eye strain, such as reading or watching movies.").

adherence in 2018 and 2019.<sup>133</sup> These imply switching rates ranging from about █% to about █%. In Table 8, Dr. Tucker further disaggregates the rate of switching by the price band of the user's current phone. For example, she shows that, for users whose phone is currently █ or more, the percent of respondents who reported switching from Android to iOS was █%.<sup>134</sup> But this may simply reflect the fact that, having switched from Android, a user likely switched to a more expensive iPhone; this does not mean that those with an expensive Android phone are likely to switch to iOS, as Dr. Tucker implies.<sup>135</sup>

68. Fourth, Dr. Tucker compares switching between iOS and Android to some estimates of the rate of switching in orange juice, liquor, and ketchup.<sup>136</sup> Starting from the premise that these industries are not characterized by high switching costs, she concludes that, because these products have similar switching rates as iOS and Android, iOS and Android must also not have high switching costs.<sup>137</sup> At any rate, these comparisons are not directly useful for understanding switching rates or costs. What is relevant is the extent that users would switch in response to a SSNIP in the relevant markets, which here are Android App Distribution and In-App Billing Services. Therefore, the most relevant comparison related to orange juice would be the rate that consumers would switch grocery stores if the price of orange juice at one store increased. Also, these comparison products are purchased much more frequently than phones as they are perishable and they deplete as they are consumed. For example, the paper that Dr. Tucker cites on orange juice records 9.37 purchases by the average household in their sample

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<sup>133</sup> Rysman Opening Report, ¶ 187 (citing to Google, "US Smartphone NPS Analysis," November 2018, GOOG-PLAY-004556784.R-813.R, at 793.R and Google, "US Smartphone NPS Analysis," January 2020, GOOG-PLAY-005705974.R-012.R, at 985.R.) A Google survey of consumers showed the overall Android to iPhone churn rate is approximately 13% in the US, 10% in the UK, and 7% worldwide from 2018 to 2020. *See* Rysman Opening Report, ¶ 187 (citing to Google, "US Android -> iOS Switcher Analysis," September 2020, GOOG-PLAY-011640881, at 882 and Google, "GB Android -> iOS Switcher Analysis," January 2021, GOOG-DOJ-27418506-510, at 507.).

<sup>134</sup> Tucker Report, Table 8.

<sup>135</sup> Tucker Report, ¶ 359.

<sup>136</sup> Tucker Report, ¶ 173.

<sup>137</sup> Tucker states that "Economists generally do not consider these products to have large switching costs because it is easy and cheap for consumers to choose a new brand each time they go to the grocery store," but provides no citation. Tucker Report, ¶ 173.

over 3 years.<sup>138</sup> However, a report from Kantar WorldPanel indicated that phones are purchased significantly less frequently: “[i]n 2016, American smartphone owners used their phones for 22.7 months on average before upgrading” and “[b]y 2018, that number had increased to 24.7” and smartphones do not deplete as they are consumed.<sup>139</sup> Switching could naturally be higher over the same time period for these staples because there are so many more opportunities to switch given the short life cycle of the product. A smartphone purchase is also a much more significant decision for a consumer than the choice of condiments given that smartphones are far more expensive.<sup>140</sup> Dr. Tucker ignores these obvious, real-world differences in her comparisons. Consequently, these cross-industry comparisons of switching rates are irrelevant and, therefore, do not affect my opinions.

69. In my Opening Report, I provided evidence that switching between Android and iOS would not be sufficient to discipline a hypothetical monopolist in Android App Distribution or In-App Billing Services.<sup>141</sup> As stated above, what is relevant is switching that would occur in response to a small but significant increase in commission above the competitive level by a hypothetical monopolist in my proposed markets. As an illustration, the average price per

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<sup>138</sup> If households make about 3 ( $=9.37/3$ ) purchases in a year, and switch with a probability of 14%, then the probability of switching at least once in a year is 36% ( $=1-(1-0.14)^3$ ). Dubé, Jean-Pierre, Günter J. Hitsch, and Peter E. Rossi, “Do Switching Costs Make Markets Less Competitive?,” Working Paper, March 2008, available at <https://www.semanticscholar.org/paper/Do-Switching-Costs-Make-Markets-Less-Competitive-Dub%C3%A9-Hitsch/33a075aba4d2fcfb3b4b0a5f9dfd4bd5a4a1dc>, pp. 1-49, at p. 18. Similarly, the time between ketchup purchases was 9.6 weeks, *see* Ailawadi, Kusum L., Karen Gedenk, Christian Lutzky, and Scott A. Neslin, “Decomposition of the Sales Impact of Promotion-Induced Stockpiling,” *Journal of Marketing Research*, Vol. 44, No. 3, 2007, pp. 450-467, at p. 454. The study that she cites on Liquor estimates brand retention based on the correlation of a brand's sales in the current year with the same brand's share in the previous year. This is not a switching rate as there may be many reasons why shares are correlated overtime, and the study only controls for advertising spending and only in some models controls for price. The study, published in 1969, does not seem relevant to switching rates between Android and iOS devices. *See* Simon, Julian L., “The Effect of Advertising on Liquor Brand Sales,” *Journal of Marketing Research*, Vol. 6, 1969, pp. 301-313, at pp. 303-304.

<sup>139</sup> Ng, Abigail, “Smartphone Users Are Waiting Longer Before Upgrading – Here’s Why,” CNBC, May 16, 2019, available at <https://www.cnbc.com/2019/05/17/smartphone-users-are-waiting-longer-before-upgrading-heres-why.html>.

<sup>140</sup> The observation that some goods have lower switching rates than smart phones also does not provide evidence that the level of switching or switching costs in smart mobile devices is sufficient to constrain pricing in the relevant markets.

<sup>141</sup> *See* Rysman Opening Report, § V.C.4.

transaction in the relevant markets predicted after a SSNIP conservatively assuming that the price of apps is 100% responsive to a change in the commission is \$7.76.<sup>142</sup> According to Exhibit 21 of my Opening Report, the average price of an iOS device in 2021 was nearly \$1,000, and a new Android device in 2021 was on average just over \$200. While some users may switch after the SSNIP, there are clearly many other attributes that must factor into the decision to buy a new smart mobile device.

70. Dr. Tucker describes Google and Apple’s marketing efforts that aim to convince users that switching is easy and describes some recent improvements in technology that have made switching easier.<sup>143</sup> First, the existence of these efforts and the investments in developing these technologies indicate that there are switching costs that need to be overcome and would be relevant to users choosing to purchase a new device. Second, while the utility apps that facilitate switching may address switching costs due to data loss or time necessary to move devices, there are additional costs, like those associated with learning a new operating system, that still remain.<sup>144</sup>

71. Additionally, Dr. Tucker indicates that between 2018 and 2021, “several million adults became new smartphone users” who chose Android or Apple for the first time.<sup>145</sup> I give similar figures in my Opening Report.<sup>146</sup> Similarly, Dr. Tucker points to data showing that half of U.S. children under 11 become new smartphone owners each year.<sup>147</sup> I likewise gave similar estimates in my Opening Report.<sup>148</sup> To the extent these children are not the actual buyer of their smartphone but their parents are, it is possible that parents are buying phones from the ecosystem they prefer and have already adopted. As I explained in my Opening Report, the interconnectedness of different peripherals in the ecosystems—music streaming accounts,

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<sup>142</sup> Rysman Opening Report, Exhibit 28. This is an increase of \$0.14.

<sup>143</sup> Tucker Report, §§ IV.A.2 and IV.A.4

<sup>144</sup> See Rysman Opening Report, § V.C.4, where I explain these switching costs in greater detail.

<sup>145</sup> Tucker Report, ¶ 166.

<sup>146</sup> Rysman Opening Report, ¶ 162.

<sup>147</sup> Tucker Report, ¶ 166.

<sup>148</sup> Rysman Opening Report, ¶ 162.

headphones, TV, and car plug-ins —would encourage families to stay within the same ecosystem to maintain interoperability of their devices.<sup>149</sup>

b) The Fact that Apple and Google View Each Other As Competitors Does Not Justify Broadening the Relevant Markets

72. Dr. Tucker presents evidence that Google views Apple as a competitor of the Android ecosystem, that Apple and Google marketing materials show iOS and Android compete, and that Apple views Android as a competitor.<sup>150</sup> However, this case is about conduct that affects Android App Distribution and In-App Billing Services. Therefore, competition between Android and iOS is only relevant to the extent consumers would be willing to substitute to iOS in response to changes in the Android App Distribution or Android In-App Billing Services markets. Setting that aside, evidence that firms view each other as competitors in some sense is not evidence that they are in the same relevant antitrust market. This is because if one or both firms has exercised significant market power and if there is substitution between the two firms' products, they may view each other as competitors. But they would not view each other in this way if one or both of the firms faced competition, and therefore substitution to other products that are closer substitutes.<sup>151</sup> In other words Dr. Tucker's analysis suffers from the Cellophane Fallacy. It may also simply be that executives are responsible for considering distant threats and new business strategies to pursue, and therefore are not thinking about the specific forces of demand substitution relevant to defining a market.<sup>152</sup>

c) Similarity of Pricing and Features Does Not Suggest a Common Market Here Because, for Developers, Android and Apple App Distribution are Complements, Not Substitutes

73. Dr. Tucker cites several similarities between the Google Play Store and the App Store as evidence that Apple and Google compete.<sup>153</sup> She shows that they offer similar

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<sup>149</sup> Rysman Opening Report, ¶ 174.

<sup>150</sup> Tucker Report, §§ IV.A.1-2 and § IV.B.2.

<sup>151</sup> See above at ¶¶ 61

<sup>152</sup> See below footnote 303.

<sup>153</sup> Tucker Report, § IV.C.1.

commission structures, similar app store features, and similarly large numbers of apps. She shows that in some cases Google made changes to its commission structure or store features after Apple did.<sup>154</sup> However, one cannot infer from these facts that Apple's App Store competes with Google Play Store. It is unsurprising that two firms operating in similar but separate markets, which they each dominate, would structure their businesses similarly. And Dr. Tucker does not account for similar worldwide litigation and regulatory changes against Apple and Google that may affect their app store pricing practices. One does not see any of the hallmarks here of competition, such as firms undercutting their rival's price. Dr. Tucker's evidence therefore reinforces my conclusion that Google possesses significant market power.

d) Developers Use Android and iOS to Reach Different Sets of Consumers

74. Dr. Tucker also claims that developers substitute between Android and iOS in releasing apps.<sup>155</sup> She primarily relies on statements from Apple and Google about what they do to attract developers and how they compare their offerings.<sup>156</sup> However, this is not sufficient evidence to claim that the Google Play Store and the Apple App Store are in the same relevant market. In particular, it suffers from the Cellophane Fallacy.<sup>157</sup> Evidence that firms with

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<sup>154</sup> The standard test for establishing that two products are in the same relevant market is a SSNIP test, which is a small (the first "S" in SSNIP) price change, typically an increase of 5% or 10%. Thus, even if a feature such as offering a subscription game service causes consumers to switch products (or, in this case, causes the rival to adopt the feature), that is not evidence that the products are in the same relevant market. Rather, one must also establish that the feature is equivalent to a small price change, such as a 5% change in the commission rate that Google charges from the perspective of developers and users. Dr. Tucker does not establish that these features satisfy this condition, nor does she recognize that the size of the impact of the feature matters for a competitive analysis. *See e.g.* U.S. Horizontal Merger Guidelines, § 4.1.2; OECD, "Market Definition," 2012, at p. 30; Ulrick, Shawn W., et al., "Defining Geographic Markets with Willingness-to-Travel Circles," *Supreme Court Economic Review*, Vol. 28, No. 1, 2020, pp. 241-284, at 265 ("If the evidence shows that raising price by 50% from the competitive level causes a substantial number of consumers to switch to a substitute product, so much so that the price increase would be unprofitable, that is not evidence that the products are in the same relevant market because the price increase is too large.")

<sup>155</sup> Tucker Report, ¶ 198.

<sup>156</sup> Tucker Report, § IV.C.3.

<sup>157</sup> *See* ¶ 72 above for a definition.



substantial market power face some substitution at the margins is not evidence that the relevant product market needs to be expanded.<sup>158</sup>

75. Furthermore, although Dr. Tucker asserts that there is substitution between app stores for developers, she does not address the level of substitution. In fact, Dr. Tucker states that the extent of substitution is, in fact, limited: “Developers with limited resources may need to launch their app on either the Apple App Store or the Google Play store before launching on the other app store.”<sup>159</sup> Thus, according to her statement, the only developers that face the choice of which platform on which to first launch are those developers with limited resources and even then, only for a limited time. Similarly, she states that “small and mid-size developers cannot always ‘prioritize both iOS and Android.’”<sup>160</sup>

76. But in fact, Dr. Tucker and I have a deeper disagreement. Whereas Dr. Tucker argues that developers view OSs as substitutes, in my Opening Report, I argue that for many developers, releasing apps for both Android and iOS are complements.<sup>161</sup> Dr. Tucker counters with evidence that developers sometimes select which system to prioritize in their development. However, there is no contradiction between her evidence and my claims. As I described in my Opening Report, many developers multi-home and view iOS and Android as complements.<sup>162</sup> The definition of a complement is that consuming one product enhances the utility of consuming the other product.<sup>163</sup> If the two products do not affect the utility of the other, they are independents.<sup>164</sup> Developing apps for iOS and developing apps for Android may be either complements as I argued in my Opening Report or they could be independents. For apps that have a social network element or data collection element, it is valuable to have as many

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<sup>158</sup> See Rysman Opening Report, ¶¶ 336-338 for a discussion of this point.

<sup>159</sup> Tucker Report, ¶ 198.

<sup>160</sup> Tucker Report, ¶ 200.

<sup>161</sup> Rysman Opening Report, ¶ 192

<sup>162</sup> Rysman Opening Report, ¶ 327.

<sup>163</sup> Samuelson, Paul, “Complementarity: An Essay on The 40th Anniversary of the Hicks-Allen Revolution in Demand Theory,” *Journal of Economic Literature*, Vol. 12, No. 4, 1974, pp. 1255-1289, at 1255-1256, and 1259.

<sup>164</sup> Samuelson, Paul, “Complementarity: An Essay on The 40th Anniversary of the Hicks-Allen Revolution in Demand Theory,” *Journal of Economic Literature*, Vol. 12, No. 4, 1974, pp. 1255-1289, at 1255-1256, and 1259.

consumers as possible on the app, so that the release of an app on a new platform enhances the value of the app on other platforms for the developer. Dr. Tucker never claims that releasing an app on Android makes the iOS app less valuable for a developer, or vice versa. Thus, she does not establish that the Android and iOS app stores are substitutes for developers. This also explains why Google did no more than match Apple's pricing rather than undercut Apple's pricing despite evidence that Apple offers a more profitable app store.<sup>165</sup> There is no need to undercut pricing of a complementary or independent product.

77. In addition, just because we do not observe all app developers releasing every app simultaneously on all platforms does not mean that platforms are substitutes. If developers delay release on one platform, it is because the relative costs and benefits do not add up to an attractive option for the developer.

78. Dr. Tucker's evidence of how developers release apps to different platforms supports my interpretation. Dr. Tucker's statements quoted above show that the importance of choosing between platforms is limited both in the number of developers and the length of time that it is relevant.<sup>166</sup> Also, it is clear from Dr. Tucker's statements that release on both platforms is generally desirable and, to the extent this choice is relevant, it is driven by resources, not because releasing on one platform causes release on the other platform to be less valuable. That is, Dr. Tucker does not show that releasing on one platform is a substitute for another platform.<sup>167</sup> In all of the examples of developers prioritizing iOS in paragraph 199 of her report, the developer releases on both platforms in less than a year (except Fortnite which released in 2 years).<sup>168</sup> That is consistent with my claim that developers view releases on different platforms as complements, or at least not substitutes.

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<sup>165</sup> Tucker Report, ¶ 212. Rysman Opening Report, footnote 651.

<sup>166</sup> See above ¶ 75.

<sup>167</sup> I view the "limited resources" that Dr. Tucker describes as an income effect in the sense that Samuelson (1974) describes. See below, footnote 338.

<sup>168</sup> Tucker Report, ¶ 199.

79. In Rysman (2004), I present a formal mathematical model that clarifies these issues.<sup>169</sup> In the model, consumers make a discrete choice among available platforms. Consumers can choose only one platform. Sellers choose which platforms to sell on. Sellers may choose to be on as many platforms as they would like. I show simple assumptions under which the seller's decision is separable (*i.e.*, being on one platform does not make being on another platform more or less valuable). Thus, platforms are *independent* from the point of view of developers; platforms are neither substitutes nor, necessarily, complements.<sup>170</sup> As a result, pricing or investment by one platform may affect the value to a developer of selling on that platform but does not affect the value to a developer of selling at another platform, holding consumer choices constant. Naturally, attracting sellers still makes a platform more valuable to consumers, and consumer usage makes a platform more attractive to sellers. My model is entirely consistent with the facts that Dr. Tucker relies upon, such as the fact that Apple and Google “invest in their app stores to attract developers as part of creating an ecosystem that is attractive for users,” as well as Dr. Tucker's discussion of the “holy war,” the “sim-ship” examples, DSAT surveys, the “monetization gap” and other evidence she provides.<sup>171</sup> Those discussions by Dr. Tucker are not evidence that developers substitute between iOS and Android.

80. To be clear, my discussion of Apple and Google's *other* products as potential substitutes for consumers does not imply that these products are in the same relevant *two-sided* market. Dr. Tucker and I agree that iPhones and Android phones are substitutes for some consumers but, as Dr. Tucker recognizes, whether they are in the same relevant market depends on whether substitution from one device to the other is enough to deprive Google or Apple of

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<sup>169</sup> Rysman, Marc, “Competition Between Networks: A Study of the Market for Yellow Pages,” *The Review of Economic Studies*, Vol. 71, No. 2, April 2004, pp. 483-512, at pp. 490-491.

<sup>170</sup> The assumption is that sellers have constant returns to scale – that is, costs scale up proportionally with quantity. As a result, sales at one platform do not make sales at another platform more or less costly, so there is no cost reason why selling at one platform affects the value of selling at another. Similarly, because consumers use only one platform, there is no demand-side reason why selling at one platform makes selling at another more valuable. This would not be the case if consumers were at multiple platforms, because then selling at one platform would cannibalize sales through another platform. Thus, platforms in this model are not complements or substitutes to each other. They are independent.

<sup>171</sup> See *e.g.*, Tucker Report, ¶¶ 188, 187, 201, 207, and 212.

substantial business.<sup>172</sup> As presented in Section III.C.1.a), I argue that the level of substitution is too low to include the Apple App Store in the Android App Distribution Market and in Section III.C.1.b) that substitution between Apple and Google is subject to the Cellophane Fallacy.

e) Disparate Pricing Between Android and iOS Devices Shows that Apple Is Not a Substitute to the Google Play Store

81. Dr. Gentzkow's analysis of the prices of Android and iOS smart mobile devices is also relevant when considering whether Apple constrains the Google Play Store.<sup>173</sup> This is because the high price of smart mobile devices, and differences in the tendency of Android users to spend on technology, contribute to the cost of switching mobile OS, which prevents substitution from Android App Distribution to the Apple App Store.<sup>174</sup> I explain below that while Dr. Gentzkow's analysis shows a downward trend in Android device prices, it hides the widening gap between iOS and Android device prices.

82. As Dr. Gentzkow notes, "[p]artly as a result of Google's decision to make key components of the Android ecosystem available for free, average prices for Android smartphones are relatively low and have fallen over time. This contrasts with prices for iOS smartphones which are higher and have been increasing... In 2021, the average price of Android smartphones was \$239 compared with \$967 for iOS smartphones"<sup>175</sup> This is a significant difference in the average price of smartphone between the two OSs of \$728 in 2021.

83. The trend in prices is also significantly different. Additionally, despite Dr. Gentzkow's characterization that Android device prices have been decreasing since 2008, his Exhibit 3 shows that Android average smartphone prices decreased from roughly \$400 in 2008 to

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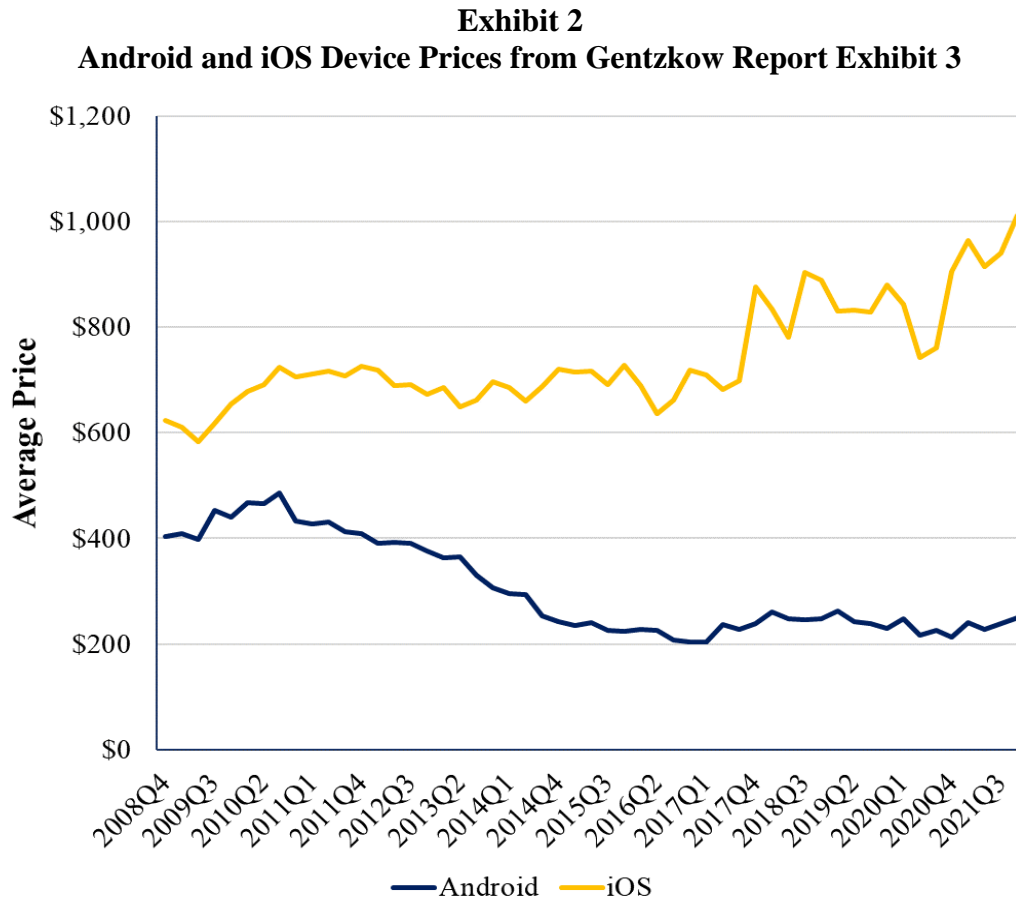
<sup>172</sup> See e.g. Tucker Report, ¶ 88 – 91 and footnote 56 citing to Rubinfeld, Daniel L., "Quantitative Methods in Antitrust," Issues in Competition Law and Policy, 2008, p. 728 ("Whether there is sufficient demand substitution to prevent the exercise of market power depends on the extent to which consumers will be diverted to other products in the face of a price increase (as measured by the price elasticity of demand for the product). Thus, identifying the structure of the demand for products is central to the analysis of market definition.").

<sup>173</sup> Gentzkow Report, Exhibit 3.

<sup>174</sup> I discuss this in more detail in my Opening Report, *See e.g.*, ¶¶ 171-173, and 186-191.

<sup>175</sup> Gentzkow Report, ¶ 161.

roughly \$200 in 2017 Q1 but have shown a modest increase to approximately \$240 in 2021Q3. During the same period, average iPhone prices have continued to increase from around \$600 in 2008 to over \$1,000 in 2021.<sup>176</sup> Dr. Gentzkow plots the two price charts separately with different scales, thereby minimizing their difference. In Exhibit 2 below, I recreate Dr. Gentzkow's Exhibit 3 by plotting the Android and iOS device prices on the same chart to demonstrate their differences.



Sources: Gentzkow Report, Exhibit 3 (citing Bernheim Production Materials ("IDC Quarterly Mobile Phone Tracker"); "IDC's Worldwide Mobile Phone Tracker Taxonomy 2020," GOOG-PLAY-010801633-669).

<sup>176</sup> Gentzkow Report, Exhibit 3. I present very similar statistics in my Opening Report (see Rysman Opening Report, Exhibit 51).

84. My analysis in my Opening Report also showed that Android dominates lower priced smartphones; between 2017 and 2021, Android's share of smartphones under \$500 was 97%, whereas iPhone had just 3%. Of smartphones sold over \$500, iPhone instead had a 64% share (compared with Android's 36% share).<sup>177</sup>

f) Summary of Dr. Tucker's Analysis that Apple Constrains Google in the Relevant Market

85. To summarize, because Dr. Tucker fails to address the Cellophane Fallacy, fails to address the size of the investments she considers relative to a SSNIP, misunderstands the concept of complements, and mischaracterizes the interaction between consumers, platforms, and app developers, she fails to provide any convincing evidence that Apple provides a competitive constraint on Google in the antitrust sense sufficient to refute my SSNIP analysis.

2. *Web Transactions Do Not Constrain Google In the Android App Distribution Market*

86. Dr. Tucker argues that content subscriptions and purchases of other digital content on websites should be considered part of the relevant antitrust market and that they constrain Google's market power.<sup>178</sup> She argues that there are a number of apps that allow purchases to be made on websites, and which may generate a significant number of visitors or revenues from their webpages.<sup>179</sup> To begin with, this is simply irrelevant. The fact that some developers can monetize their Android app through the web might be informative about the different monetization strategies employed by developers and by Google. However, it says nothing about competition to distribute Android apps or the power that might be wielded by an actual or hypothetical monopolist of Android app distribution. Furthermore, Dr. Tucker does nothing to establish that Android apps with websites would be able to capture a sufficient number of

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<sup>177</sup> Rysman Opening Report, ¶ 333 and Exhibit 50. *See also* Rysman Opening Report, Exhibit 49, showing a distribution of Android and iOS smartphones sold by price bracket.

<sup>178</sup> Tucker Report, § V.A.

<sup>179</sup> *See e.g.* Tucker Report, ¶¶ 220-221.

consumers such that Google would be constrained in its ability to increase prices in the relevant markets.

87. I also find that Dr. Tucker’s claims that consumers or developers could shift to these alternatives, like web transactions ( or web apps or gaming platforms discussed in the next section), are at odds with her position that when users encounter “roadblocks,” like having to switch from a mobile app to a website, this creates a “negative spillover effect.” While Dr. Tucker describes these negative spillovers affecting the platform, they may also directly affect the developer by making that developer less attractive to consumers who must travel to other channels to make their transactions.<sup>180</sup> Because Dr. Tucker does not provide enough consideration to these effects she incorrectly argues for a broader market.

88. Dr. Tucker presents several analyses that compare the number of visitors and revenues on websites for select developers in Tables 4.A., 4.B, 5, and Figures 19-21. These analyses are not directly informative about the ability of developers to steer users to their websites for purchases because they are not limited to users that actually have or have used the native app. Some users may simply prefer to access these developers’ content through the web rather than downloading an app and would not have considered downloading the app. Developers with limited visitors or revenue on their native apps are unlikely to be able to steer sufficient users away from Android App Distribution and constrain the prices of Google or a hypothetical monopolist.

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<sup>180</sup> Tucker Report, ¶ 112 (“For example, if a user encounters roadblocks to canceling a subscription in which they are no longer interested, this may be beneficial to the developer but may dissuade the user from trying out new subscriptions in other apps. That would be a negative spillover effect that would negatively affect other apps that offer subscriptions. If, instead, canceling a subscription was easy and hassle-free, this would encourage the user to try out new subscriptions in other apps, resulting in a positive spillover effect. The sponsor of a transaction platform like the Google Play store must work hard to ensure that these spillover effects are positive rather than negative. Successfully supporting positive spillover effects for users and developers enhances the value of network effects, which in turn creates more value for both sets of consumers of the Google Play store.”)



89. Similarly, the observation that some apps or types of apps are “consumption” only or monetize completely outside of Google Play does not imply that other developers could or would adopt this model.<sup>181</sup>

90. Other apps may not be able to shift users to their websites because their native app experience is integral to their success. This problem is apparent in Dr. Tucker’s analysis of Match Group Dating Services in Figures 19-21. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] However, the other Match Group sites started as websites and derive more revenue and visits from their websites.<sup>183</sup> Any signals about web usage from these apps are also likely to be affected by the age of users; OurTime, geared toward singles 50 and older, makes nearly all its revenue from the web, while Tinder, which Match describes as geared toward users aged 18-30,<sup>184</sup> [REDACTED]<sup>185</sup> Even the other Match Group sites rely on their apps for significant amounts of their revenue, and it is not clear that they could effectively shift this revenue to their websites.

91. While some developers may have a business model that is amenable to shifting spending to a website, many others will face challenges. Mobile apps are often developed to take

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<sup>181</sup> Tucker Report, ¶ 224. See § 112 for further discussion of apps that are free to download and or monetized outside of Google Play.

<sup>182</sup> Stampler, Laura, “Inside Tinder: Meet the Guys Who Turned Dating Into an Addiction,” Time, February 6, 2014, available at <https://time.com/4837/tinder-meet-the-guys-who-turned-dating-into-an-addiction/>.

<sup>183</sup> See Match Group, Inc., “Annual Report (Form 10-K),” February 24, 2022, p. 7 (explaining that Match, OkCupid and PlentyOfFish all launched online by 2004, before the launch of the first smartphone); Press Release, OurTime.com, “IAC, Operator of Match.com and Other Popular Dating Sites, Unveils New Online Dating Site for Singles 50-Plus,” May 10, 2011, available at <https://www.prnewswire.com/news-releases/iac-operator-of-matchcom-and-other-popular-dating-sites-unveils-new-online-dating-site-for-singles-50-plus-121552698.html> (announcing launch of OurTime website, without any discussion of a mobile app).

<sup>184</sup> Match Group, Inc., “Annual Report (Form 10-K),” February 24, 2022, p. 6 (explaining that “Tinder’s patented Swipe technology has led to significant adoption, particularly among 18 to 30 year-old users, who were historically underserved by the online dating category”).

<sup>185</sup> Tucker Report, Figure 20.

advantage of unique features of mobile technologies *e.g.* location information or the touch screen.<sup>186</sup> Tinder, which Dr. Tucker leaves out of Figure 19, is one example; it is famous for users interacting with it by “swiping right.”<sup>187</sup> [REDACTED]

[REDACTED]<sup>188</sup> Apps where users gain value from the native app experience may have more difficulty selling in-app content to users outside of the app where the app’s value may be less apparent. Developers may be able to replicate some but not all of the features of their apps with a web-app, but as I describe in Section III.C.3, web-apps are not a viable substitute for developers and users. Users directed to a website from an app to make a purchase will face a friction in completing their transaction. Dr. Tucker seems to agree that this would be an issue for developers because the friction it creates could cause the consumer to become less interested in interacting with the app or making additional purchases.<sup>189</sup>

92. Google recognizes that shifting transactions to the web would not be feasible for many developers. In an internal presentation regarding a program to [REDACTED], Google identified as potential participants a [REDACTED]<sup>190</sup> Google also explained that

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<sup>186</sup> Rysman Opening Report, ¶¶ 200-202.

<sup>187</sup> Stampler, Laura, “Inside Tinder: Meet the Guys Who Turned Dating Into an Addiction,” Time, February 6, 2014, available at <https://time.com/4837/tinder-meet-the-guys-who-turned-dating-into-an-addiction/>.

<sup>188</sup> Adrian Ong (Match) Deposition at pp. 12–13 ([REDACTED])

<sup>189</sup> Dr. Tucker states, “For example, if a user encounters roadblocks to canceling a subscription in which they are no longer interested, this may be beneficial to the developer but may dissuade the user from trying out new subscriptions in other apps. That would be a negative spillover effect that would negatively affect other apps that offer subscriptions. If, instead, canceling a subscription was easy and hassle-free, this would encourage the user to try out new subscriptions in other apps, resulting in a positive spillover effect.” While Dr. Tucker is discussing potential spillovers from the platform’s perspective, these effects would naturally also affect developers who may find that customers are less likely to make additional purchases if they face roadblocks when they try, and I think she would agree with the statement if “canceling” was replaced with signing up for a subscription. *See* Tucker Report, ¶ 112.

<sup>190</sup> Google, “Modular Subs EAP,” April 8, 2020, GOOG-PLAY-011546624 – 636, at 628.

the approach it took with [REDACTED]

[REDACTED].”<sup>191</sup>

93. Evidence from app developers also indicates that there would be challenges to shifting to a consumption-only model. [REDACTED] [REDACTED].”<sup>192</sup> [REDACTED] estimated that Android signups would be [REDACTED]% [REDACTED] if it went consumption only.<sup>193</sup> [REDACTED] estimated that going consumption only would result in a [REDACTED]% [REDACTED] in Android users.<sup>194</sup> [REDACTED] suggested that, “As of now, expected [REDACTED] [REDACTED] given current Mobi[le] experience,” and “[e]ven with optimised flow, [REDACTED] [REDACTED].”<sup>195</sup> These estimated losses from shifting traffic to the web illustrate that for some developers without the scale or brand recognition of these large players, web transactions may not be a viable alternative.

94. Dr. Tucker goes on to point out that “Google has specifically reduced service fees for categories of developers who offer subscriptions via the web through its ‘App Accelerator programs.’”<sup>196</sup> This example shows that Google possesses market power because it is able to price discriminate, *i.e.*, it is able to charge different prices to different developers.<sup>197</sup> The fact that Google targeted these reductions to certain categories of apps suggests that it recognized that other types of apps may not be able to shift spend off of Google Play. Moreover, Dr. Tucker

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<sup>191</sup> Google, GOOG-PLAY-010547095 – 114, at 100.

<sup>192</sup> [REDACTED] “[REDACTED], [REDACTED]-GOOGLE-00001105 – 109, at 107 (“[REDACTED]”).

<sup>193</sup> Netflix, “Google Play Model Inputs and Summary GLOBAL,” NETFLIX-GOOGLE-00000019, sheet “Summary” cell C6.

<sup>194</sup> SoundCloud, “Google Play Store, Paths Forward,” January 20, 2021, SOUNDCLLOUD\_000192 – 211, at 211.

<sup>195</sup> SoundCloud, “Google Play Store, Paths Forward,” January 20, 2021, SOUNDCLLOUD\_000192 – 211, at 211. The study here shows that SoundCloud would not go consumption-only on Android if it lost more than 20% of its Android users. Because I understand that SoundCloud Go and Go+ subscription plans are available on the Android app (*see* Rysman Rebuttal Report Backup Production), I infer that SoundCloud would have lost more than 20% of its Android users on these plans if it stopped offering them in-app.

<sup>196</sup> Tucker Report, ¶ 235.

<sup>197</sup> *See* Rysman Opening Report, ¶ 286.

ignores that Google currently restricts the ability of apps to steer consumers to their websites to make purchases.<sup>198</sup> This means that web transactions do not discipline Google’s market power in the status quo, even if they were in the market.

3. *Dr. Tucker’s Evidence Does Not Show Web Apps Constrain the Google Play Store*

95. Dr. Tucker argues that web apps should be included in the relevant market, because “developers and users can and do engage in digital content transactions on websites and PWAs (Progressive Web Apps), rather than on app stores such as the Google Play store.”<sup>199</sup> Further, she claims that the “evidence demonstrates that there is an ability to switch between app stores and websites/PWAs and that this exerts a competitive constraint on Google in operating the Google Play store.”<sup>200</sup> However, the evidence Dr. Tucker uses to arrive at this conclusion is either irrelevant for the focal product, or does not prove that web apps are substitutable at a level that would constrain the hypothetical monopolist from imposing a SSNIP above a competitive benchmark.

96. First, Dr. Tucker notes that apps such as Slack, Facebook, and Twitter exist as both native and web apps, “providing strong evidence that users have choices for interacting on” them.<sup>201</sup> But this may simply mean that the developers see the two channels as complements; if either provided access for all users, both would be unnecessary. In addition, Dr. Tucker presents evidence that Starbucks “doubled its daily active users after introducing its PWA.”<sup>202</sup> But Starbucks does not monetize its in-app content.<sup>203</sup>

97. Second, Dr. Tucker presents evidence that Tinder Online “enables users to access the app through their computer when they do not have access to their phones” and concludes that

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<sup>198</sup> Rysman Opening Report, ¶ 504.

<sup>199</sup> Tucker Report, ¶ 250.

<sup>200</sup> Tucker Report, ¶ 250.

<sup>201</sup> Tucker Report, ¶ 238.

<sup>202</sup> Tucker Report, ¶ 240.

<sup>203</sup> Rysman Rebuttal Report Backup Production.

“PWAs exert a competitive constraint on the Google Play Store” because developers do not pay service fees to Google even if the user completes the transaction on an Android device using the Google Chrome browser.”<sup>204</sup> She goes on to say that “[i]f Google raised the quality-adjusted price of transactions via the Google Play store above the level that would prevail absent monopoly power, developers would have incentives to transact via PWAs instead,” giving the example that Tinder Gold is \$22.49/month via Tinder’s PWA and \$24.99 on the native app.<sup>205</sup> However, despite Google having raised its commission above the competitive level,<sup>206</sup> Dr. Tucker provides no evidence of Android users substituting from Tinder’s Android app to Tinder’s PWA despite the difference in price (or from any native Android app to any web app for that matter). Indeed, Google’s policies prevent Tinder from leading users to its lower online price in its Android app.<sup>207</sup>

98. Third, Dr. Tucker suggests that native apps and web apps should be in the same market because Apple has “limited the performance of PWAs by restricting access to push notifications” and thus “perceives PWAs as a competitive threat.”<sup>208</sup> However, Dr. Tucker ignores her own framework that suggests market definition should focus on substitution from the focal product (the Google Play Store), not the response of an alternative mobile operating system (iOS), which for all the reasons I explain in my Opening Report is not in the relevant market.<sup>209</sup>

99. Fourth, Dr. Tucker suggests that Google’s support for PWAs is “competition with Apple by differentiating the tools it offers to support developers and users that are not available

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<sup>204</sup> Tucker Report, ¶¶ 242-244.

<sup>205</sup> Tucker Report, ¶ 244.

<sup>206</sup> Rysman Opening Report, ¶ 340.

<sup>207</sup> See, e.g., <https://support.google.com/googleplay/android-developer/answer/10281818#zippy=%2Ccan-i-communicate-with-my-users-about-alternative-ways-to-pay%2Ccan-i-communicate-with-my-users-about-promotions-on-other-platforms> (“Within an app, developers may not lead users to a payment method other than Google Play’s billing system unless permitted by the Payments policy. This includes directly linking to a webpage that could lead to an alternate payment method or using language that encourages a user to purchase the digital item outside of the app.”)

<sup>208</sup> Tucker Report, ¶ 247.

<sup>209</sup> Rysman Opening Report, § V.C.4.

from Apple.”<sup>210</sup> However, the evidence Dr. Tucker presents suggests that Google’s motivations for improving and enhancing PWAs performance could be equally motivated by competitive pressure in a market for browsers (and the Google Chrome Browser). For example, the website quoted by Dr. Tucker also notes that “[t]he description and screenshots properties are currently used only in Chrome for Android and require an experimental flag to be enabled in Chrome 90.”<sup>211</sup> It is not as seamless as a native app as users must go through an extra step to enable it and that “if a user opts not to install a progressive web app for a site they frequently visit, they may have to constantly deal with the pop-up, which could get annoying fast.”<sup>212</sup>

100. Fifth, I would note that Dr. Tucker does not dispute the evidence presented in my Opening Report, particularly that:

- Web-based apps often have longer response times and are harder to navigate, resulting in a worse user experience.<sup>213</sup> Web apps also require connection to the internet.<sup>214</sup>
- In 2012, Facebook decided to move away from an HTML5 version to a native app because of limitations in “performance and feature set” such as sub-optimal experience of using cameras on the mobile web.<sup>215</sup>

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<sup>210</sup> Tucker Report, ¶ 249.

<sup>211</sup> Russell, Brandon, “Installing a PWA is about to feel more native on Android,” XDA Developers, March 29, 2021, available at: <https://www.xda-developers.com/installing-pwa-more-native-on-android/>.

<sup>212</sup> Russell, Brandon, “Installing a PWA is about to feel more native on Android,” XDA Developers, March 29, 2021, available at: <https://www.xda-developers.com/installing-pwa-more-native-on-android/>.

<sup>213</sup> Rysman Opening Report, ¶ 214 citing to GeeksforGeeks, “Difference between Native Apps and Web Apps,” March 31, 2021, available at <https://www.geeksforgeeks.org/difference-between-native-apps-and-web-apps/>; Store and Rooche, “What are the Benefits of Native App?” June 20, 2022, available at <https://rooche.net/benefits-of-native-app/>.

<sup>214</sup> Rysman Opening Report, ¶ 213, citing to GeeksforGeeks, “Difference between Native Apps and Web Apps,” March 31, 2021, available at <https://www.geeksforgeeks.org/difference-between-native-apps-and-web-apps/>; Store and Rooche, “What are the Benefits of Native App?” June 20, 2022, available at <https://rooche.net/benefits-of-native-app/>.

<sup>215</sup> Rysman Opening Report, ¶ 215 citing to Langel, Tobie, “Introducing the Mobile W3C Community Group,” Facebook Developers, February 27, 2012, available at <https://web.archive.org/web/20120511110804/http://developers.facebook.com/html5/blog/post/2012/02/27/introducing-the-mobile-w3c-community-group/>. See also Reisinger, Don, “Facebook close to launch of native Android app – report,” CNET, October 8, 2012, available at <https://www.cnet.com/tech/services-and-software/facebook-close-to-launch-of-native-android-app-report/>.

- Google recognizes that native apps are the “preferred/guaranteed experience” with benefits like offline mode, being based on the home screen or app launch, and having home screen widgets.<sup>216</sup>
- Data from Comscore indicates users spend the vast majority (over 85% in all countries) of their time in native apps.<sup>217</sup>

101. Moreover, one of Dr. Tucker’s sources on PWAs states “[b]ut there’s one near-golden rule about web apps: the native app is probably better,” referring to the situation prior to progressive web-apps.<sup>218</sup> PWAs may have improved the capabilities of web-based apps as noted above, but Google recognizes they still may fall short of native apps in terms of features like “Smooth animation transitions; Native gestures; Native menus; [and] Material UI Guidelines.”<sup>219</sup> Google recognized that “[n]ative apps will always have tighter platform integration than PWAs. This is by design: PWAs are not designed to replace native apps.”<sup>220</sup> In particular, web apps

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<sup>216</sup> Rysman Opening Report, ¶ 212 citing to Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 256.R.

<sup>217</sup> Rysman Opening Report, ¶ 216 citing to Comscore, “Global State of Mobile,” November 2020, available at [https://www.comscore.com/content/download/51336/2998036/file/2020\\_Global\\_State\\_of\\_Mobile.pdf](https://www.comscore.com/content/download/51336/2998036/file/2020_Global_State_of_Mobile.pdf), at p. 5. Dr. Tucker in response to Dr. Bernheim, compares visit count on native apps and web apps in Figures 32.A and 32.B of her report, and argues visit count may be more appropriate. I am not persuaded by Dr. Tucker’s analysis of visitor counts because she studies broad categories, and does not actually show that for the same app visitors would or could visit both the native and web app version. There could be a number of developers in “General News” for example whose business model causes them to focus on web exclusively. Further, games is one of the most important categories for Google Play in terms of spend (*See* Tucker Report, ¶ 273) and the visits to the native app are a significant majority of visits in that category (*See* Tucker Report, Figure 32.A).

<sup>218</sup> Miller, Paul, “Web apps are only getting better,” The Verge, April 11, 2018, available at: <https://www.theverge.com/circuitbreaker/2018/4/11/17207964/web-apps-quality-pwa-webassembly-houdini>. While

<sup>219</sup> Rysman Opening Report, ¶ 212 citing to Google, “Different ‘App-like’ Experiences,” GOOG-PLAY-001882239.R-299.R, at 274.R.

<sup>220</sup> Google, “PWAs in a Nutshell,” October 9, 2018, GOOG-PLAY-007310413-418, at 418; *see also* Google, “DRAFT: Native / Web Developer Platform Evolution,” June 28, 2018, GOOG-PLAY-004453915-924, at 917 (“Most of the technical issues they face were better solved on native platforms and those choices have influenced today’s. Some of those are being addressed on the web, but much of the tools support and talent pool are historically on native, and momentum is high.”).



cannot access all the system components and APIs available to native apps,<sup>221</sup> like phone functionality,<sup>222</sup> calendar,<sup>223</sup> contacts,<sup>224</sup> and compatibility with ancillary devices like wearables or Smart TVs.<sup>225</sup> Google noted that push notifications had “less friction on native than web.”<sup>226</sup> Dr. Tucker’s focus on PWAs ignores the limitations of web-apps more generally that have existed throughout the period in which Google is alleged to have engaged in the conduct.<sup>227</sup>

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<sup>221</sup> Patel (Nvidia) Deposition, pp. 74-75 (“Q And NVIDIA prefers that users access GeForce NOW through the native client compared to the browser on Android devices? A The native client allows NVIDIA to provide a better experience to users than a browser client would. Q Why is that? A The native client provides access to lower level components that NVIDIA can use to optimize the service. One example can be optimizing how frames are decoded. We can optimize the algorithm. In a browser experience, you would have to rely on the browser’s decoding methodology and restrict significantly how much we can optimize that.”); pp. 200-201 (“Q. You would agree with me that in general, NVIDIA’s browser-based GeForce NOW solution is inferior to the native application; correct? . . . [A] The browser-based – GeForce NOW browser-based client has the disadvantages of not being able to optimize streamed video, manage quality of service and can limit access to certain lower -- certain direct features for controllers and audio that would limit the performance of them.”).

<sup>222</sup> Goodger (Google) Deposition, p. 46 (“Q Has Google exposed the phone functionality to the web on Android? A I don’t believe so.”).

<sup>223</sup> Goodger (Google) Deposition, p. 43 (“Q Well, I have a calendar app on Android. I use a native app. Can a web app access that calendar? A I see. I’m not an expert on the -- all of the APIs that Android offers, but I’m not aware of them offering a calendaring API.”).

<sup>224</sup> Goodger (Google) Deposition, p. 45 (“Q At the time that you were on the team, contacts were not exposed to web-based apps; correct? A I don’t know -- like I said, I don’t know the final state of that discussion, like if it was added or not. I know that for some portion of my time on the team, it was not available. But I don’t know what the current state of it is.”).

<sup>225</sup> Google, “DRAFT: Native / Web Developer Platform Evolution,” June 28, 2018, GOOG-PLAY-004453915-924, at 916 (“a developer might want to make a WearOS companion app, which requires a native app.”).

<sup>226</sup> Google, “DRAFT: Native / Web Developer Platform Evolution,” June 28, 2018, GOOG-PLAY-004453915-924, at 918 (“Some features might be easier to implement or have less friction on native than web, such as notifications”).

<sup>227</sup> Facebook’s experience suggests there were limitations to web-apps in at least 2012. *See* Reisinger, Don, “Facebook close to launch of native Android app – report,” CNET, October 8, 2012, available at <https://www.cnet.com/tech/services-and-software/facebook-close-to-launch-of-native-android-app-report/>. An Epic witness explained that web apps require content data to be downloaded every time a user plays a game, while native apps store that data locally, saving time. *See* Babcock (Epic) Deposition, pp. 314-315 (“Q. Are there technical differences between web apps and native apps on Android? A. There are. Q. Could you please describe those differences for me? A. One of the biggest obstacles to running a web app for a game delivery versus running beta is storage. Every time you go to use a web app, the actual executable code and all of its content data has to be downloaded again rather than with a native app where it’s locally stored and run. Q. From your perspective as a developer, what implications do those storage differences have on the experience for the end user? A. It means waiting through the download in order to run the game. In some cases, like with Fortnite, this is a very lengthy download process.”).

102. Finally, I note that Dr. Gentzkow claims that “[w]eb apps are another alternative channel that is accessible on Android devices.”<sup>228</sup> In particular, he cites the popularity of Facebook’s mobile web app, that is “used more frequently than the Apple App Store’s Facebook app (0.8 billion versus 0.4 billion monthly average users).”<sup>229</sup> In addition, he also cites Google promoting Progressive Web Apps (“PWAs”) since 2015, and suggests that they are “becoming increasingly popular due to lower development costs and complexities while at the same time providing users with many of the benefits of native apps.”<sup>230</sup>

103. However, Dr. Gentzkow provides no evidence that web apps are making a meaningful difference to competition in Android App Distribution. As mentioned in my Opening Report, I found that U.S. spending on Android app downloads via web access is a small proportion (just █% from January 2016 to December 2021) of the amount spent on app downloads via smartphones and tablets during that same period, while I also found differences between native and web-based apps in terms of performance, features, and overall user experience.<sup>231</sup> I therefore concluded in my Opening Report that web-based apps were not an adequate substitute for native Android mobile apps and were not in the relevant Android App Distribution Market, and that developers were more likely to consider web-based apps and native mobile apps as complements.<sup>232</sup> Even if I were to accept that PWAs are a relevant form of competition, they became relevant only at the end of the at-issue period at best.

#### 4. *Gaming Platforms Are Not in the Android App Distribution Market, Contrary to Dr. Tucker’s Claims*

104. Dr. Tucker argues that Google faces competition with gaming platforms (i.e., app stores on consoles and PCs) in the relevant antitrust markets.<sup>233</sup> She explains that gaming is an

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<sup>228</sup> Gentzkow Report, ¶ 213.

<sup>229</sup> Gentzkow Report, ¶ 214.

<sup>230</sup> Gentzkow Report, ¶ 216.

<sup>231</sup> Rysman Opening Report, ¶¶ 211 - 217.

<sup>232</sup> Rysman Opening Report, ¶ 218.

<sup>233</sup> Tucker Report, § V.C.

important category for Google on the Play Store, and she lists a number of initiatives by Google related to gaming as well as internal documents where Google discusses potential competition in gaming.<sup>234</sup> She also provides examples of games that allow their players to multi-home between platforms.<sup>235</sup> I describe the problems with her evidence below.

105. Google, like any monopolist, will face some substitution at the margins, and even a firm with market power may feel compelled to innovate at times. Dr. Tucker points out that Google identifies other gaming platforms like Xbox, PlayStation, Steam, or the Microsoft Store as competitors.<sup>236</sup> A firm with significant market power in a market, like Google enjoys in Android App Distribution and In-App Billing Services, may almost by definition view their main competitors as firms that are outside of the relevant antitrust market. This is one reason why the views of executives may not be aligned with how antitrust markets are defined. Dr. Tucker also points to some initiatives that Google has taken in order to attract or better serve game developers.<sup>237</sup> Two of these initiatives relate to Google developing the ability for games to be available through the Play Store on PC.<sup>238</sup> Dr. Tucker's two other examples concern efforts to improve the experience of developers, particularly developers of high-fidelity games.<sup>239</sup> As discussed above, firms with market power have a reduced incentive to innovate but still may

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<sup>234</sup> See e.g., Tucker Report, ¶¶ 273, and 298-305.

<sup>235</sup> See e.g., Tucker Report, ¶¶ 282-298.

<sup>236</sup> Tucker Report, ¶ 299. See also ¶ 300-302. Dr. Tucker also points to Microsoft's desire as part of its acquisition of Activision to compete more in mobile gaming (see Tucker Report, ¶ 279-280, and 300), however, this merger was announced in 2022 and has been challenged by the FTC. The business strategy that Microsoft hopes to pursue in this deal may not reflect current or past substitution behavior by users and developers in the Android App Distribution market-instead it may reflect Microsoft's predictions for the future that may or may not turn out to be realistic, and Dr. Tucker does not appropriately evaluate this possibility. Novet, Jordan and Lauren Feiner, "FTC sues to block Microsoft's acquisition of Activision Blizzard," CNBC, December 8 2022, available at <https://www.cnbc.com/2022/12/08/ftc-sues-to-block-microsofts-acquisition-of-game-giant-activision-blizzard.html>.

<sup>237</sup> Tucker Report, ¶ 303-305.

<sup>238</sup> Google, "Games Futures," October 2020, GOOG-PLAY-000091853.R-922.R; Google, "Android on PC Early Access Program," GOOG-PLAY-002653755.R-774.R; and Google, "Battlestar - Bringing Play's games to desktops," November 2019, GOOG-PLAY-002432994.R-031.R at 007.

<sup>239</sup> Google, "Lion Force Strategy - Pitch Document - WIP," June 2018, GOOG-PLAY-000375525.R-582.R; Google, "Project Lion Force: A Cross-Google Game Story," July 24, 2018, GOOG-PLAY-000289306-335; Google, "High Fidelity Gaming," GOOG-PLAY-000571373.R-388.R; and Google, "Android Q Summit - Gaming Discussion," GOOG-PLAY-000300552.R-597.R

innovate, so these programs do not disprove Google’s market power. Further, these benefits, targeted toward certain sets of developers, undercut Dr. Tucker’s arguments elsewhere in her report that “localized competition” in gaming could incentivize Google to improve the quality of its entire platform.<sup>240</sup>

106. I explained in my Opening Report that the average user experience on PCs and game consoles is different than on smart mobile devices.<sup>241</sup> There may be more similarity for games, but there are still important differences. For example, games (and other apps) on smart mobile devices can take advantage of unique hardware (e.g., touch screens, accelerometers, or gyroscopes), and may not function well with a mouse or video game controller.<sup>242</sup> Consider, for example, the mobile gaming app Pokémon GO, in which users explore the outdoors with their smart mobile device.<sup>243</sup> Consumers can use their mobile devices anywhere and spend on average 4.1 hours daily on their mobile devices.<sup>244</sup> Desktop PCs, laptops, and most gaming consoles are larger and not easy to use and access “on the go.”<sup>245</sup> They are also purchased for different purposes than mobile devices.<sup>246</sup> These differences in use cases mean that consumers that want to access their content “on the go” would be less likely to switch to gaming consoles, PCs, or laptops in response to a change in the price of apps or in-app content on their Android device. Also, as I explained in my Opening Report, “mobile games tend to be casual games that appeal to mass audiences, whereas, PC and console games have higher quality, offer a more immersive

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<sup>240</sup> See Tucker Report, ¶ 500-502.

<sup>241</sup> Rysman Opening Report, ¶¶ 200-204.

<sup>242</sup> Rysman Opening Report, ¶ 200.

<sup>243</sup> Rysman Opening Report, ¶ 215.

<sup>244</sup> Rysman Opening Report, ¶ 200.

<sup>245</sup> Rysman Opening Report, ¶ 200.

<sup>246</sup> Rysman Opening Report, ¶ 203.

experience and attract more dedicated games.”<sup>247</sup> A comparison of the top 45 games on the Google Play store and Steam, showed only three apps available on both.<sup>248</sup>

107. Dr. Tucker does not seem to account for this in her analysis, but instead points to some new technologies like cloud gaming, and the Steam Deck.<sup>249</sup> The Steam Deck was only released in February 2022, and Dr. Tucker does not analyze the extent of its adoption among Android users. I note that this device currently costs \$399 to \$649, and therefore Android users who want to shift their current spending on games on their Android devices would need to determine the additional cost was worth it.<sup>250</sup> Dr. Tucker does not analyze the extent to which Android users would be willing to purchase these devices. Cloud gaming is a recently developed technology, that allows users to play games that are running on a remote data center from their devices.<sup>251</sup> According to Dr. Tucker’s Table 7, the earliest cloud gaming was available was November 2019, and has not been available on every platform during the last two years.<sup>252</sup> Nvidia’s service can currently support only 80-90 thousand players concurrently.<sup>253</sup>

108. Mobile users are likely to face challenges in using cloud gaming. Nvidia recommends using a high-quality in-home WiFi connection because the quality of service on a cellular connection can vary depending on the network conditions.<sup>254</sup> With low quality or inconsistent internet, the user experiences more visual and audio artifacts, latency, and discomfort leading to a subpar gaming experience. Nvidia also warns users that they need to consider the data cap in their cell plans. Nvidia makes that recommendation because cloud

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<sup>247</sup> Rysman Opening Report, ¶ 203

citing to Starloop Studios, “Mobile Games Vs. PC Vs. Console Games: What Market is the Best Bet?” available at <https://starloopstudios.com/mobile-games-vs-pc-vs-console-games-what-market-is-the-best-bet/>.

<sup>248</sup> Rysman Opening Report, ¶ 203.

<sup>249</sup> Tucker Report, ¶¶ 306, and 307-316.

<sup>250</sup> “Steam Deck,” Valve, available at <https://www.steamdeck.com/en/>.

<sup>251</sup> Tucker Report, ¶ 307.

<sup>252</sup> Tucker Report, Table 7.

<sup>253</sup> Patel (Nvidia) Deposition, at pp.160-161. Users may also have to queue for access, and some users are limited in the time they can use the service based on their subscription tier. *See* Patel Deposition, at pp. 163-165.

<sup>254</sup> Patel (Nvidia) Deposition, at 179-181. *See also* Patel Deposition, at p.145 (“Users need to have a robust continuous internet connection, which is not what all users have.”)

gaming at the recommended speeds would consume massive amounts of data and would push a user past their data cap in as few as six hours of gameplay.<sup>255</sup> Nvidia also recognizes that for games without a mobile experience using the touch screen on a phone to play the game is problematic because there are difficulties translating games intended for a much larger screen and because part of the screen needs to be devoted to an interface that simulates the game's native input device.<sup>256</sup> Nvidia accordingly recommends users purchase an entirely separate controller peripheral for Android devices.<sup>257</sup>

109. Google is shutting down their cloud gaming service Stadia.<sup>258</sup> Microsoft, in its response to the CMA's "Phase-2" investigation into its acquisition of Activision Blizzard, stated that cloud gaming is a "new and immature technology which the CMA has recognized faces significant challenges." It also stated that consumer uptake "is not expected to be rapid as it requires a significant change in consumer behavior."<sup>259</sup> Nvidia admits GeForce Now has never been profitable.<sup>260</sup> Dr. Tucker's discussion of cloud gaming does not address this evidence, and fails to show that cloud gaming would have constrained Google's market power or the ability of a hypothetical monopolist to raise prices in Android App Distribution.

110. Dr. Tucker also describes how some games allow users to make purchases on one platform and then use those purchases on other platforms where they have the game.<sup>261</sup> However, she mentions seven example games: Fortnite, Roblox, Genshin Impact, Vainglory, Lineage M, Lords Mobile, and PUBG Mobile.<sup>262</sup> Dr. Tucker analyzes in some detail spending behavior by

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<sup>255</sup> Patel (Nvidia) Deposition, at pp. 181-182; 192; 245-46.

<sup>256</sup> Patel (Nvidia) Deposition, at pp.145-146.

<sup>257</sup> Patel (Nvidia) Deposition, at pp.146-147.

<sup>258</sup> Peters, Jay and Alex Cranz, "Google is shutting down Stadia," The Verge, September 29, 2022, available at <https://www.theverge.com/2022/9/29/23378713/google-stadia-shutting-down-game-streaming-january-2023>.

<sup>259</sup> Wolens, Joshua, "Microsoft has a bleak outlook on cloud gaming's future," PC Gamer, October 20, 2022, available at <https://www.pcgamer.com/microsoft-has-a-bleak-outlook-on-cloud-gamings-future/>.

<sup>260</sup> Patel Deposition, at p. 159.

<sup>261</sup> See e.g., Tucker Report, ¶ 281.

<sup>262</sup> Tucker Report, ¶¶ 281, 294, and 295.

Fortnite and Roblox users but does not present an analysis of the behavior of the users of the other games.<sup>263</sup> Further, she does not put these games into context. While they are popular games, according to Google's monthly revenue data they each accounted for between █████% and █████% of spend on Games on the Play Store in the U.S. in 2020.<sup>264</sup> It is unclear whether the ability of users of these games to shift some, but potentially not all spend,<sup>265</sup> to other devices in response to an increase in the price of apps in the Android App Distribution market would be sufficient to discipline Google or the hypothetical monopolist in the market generally, across all apps. Further, this ignores many other games that are not currently cross-platform. Some developers may not be willing to implement cross-platform capabilities because it is costly to do so.<sup>266</sup> As I discuss below in Section IV.B.3, Dr. Tucker's claim that competition that is "local," *e.g.* limited to a specific segment of apps, can constrain Google's market power is both theoretical and undercut by the fact that Google has often lowered its commission only for select sets of developers rather than all developers.

111. There are examples of well-known games which are not available across platforms, or do not have the ability to transfer progress across platforms:

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<sup>263</sup> See Tucker Report, ¶¶ 281-293 and 296-297.

<sup>264</sup> Rysman Rebuttal Report Backup Production. Certain games were not available on Google Play Store during all of 2020, for these games I calculate their share of spend for the months they were available. Vainglory stopped supporting in-app transactions in April 2020 and is not included in the range above. See Bengel, Chris, "Fortnite removed from App Store and Google Play, Epic Games files lawsuit against Apple," *CBS Sports*, August 17, 2020, available at <https://www.cbssports.com/general/news/fortnite-removed-from-app-store-and-google-play-epic-games-files-lawsuit-against-apple/>; Genshin Impact, "Genshin Impact Official Launch Time and Recommended Device Specs," September 8, 2020, available at <https://genshin.hoyoverse.com/en/news/detail/5284>. Vainglory, "Vainglory: Community Edition," April 1, 2020, available at <https://www.vainglorygame.com/news/vainglory-community-edition/>.

<sup>265</sup> Tucker Report, ¶ 292 ("Epic's internal analyses and planning documents which determined that the 'base case' if Fortnite was removed from the Google Play store and the Apple App Store '50% of app store revenue [would] transfer to other platforms.' Epic also estimated that 20 to 40% of revenue from spending via the Google Play store and Apple App Store actually switched to other platforms after it was removed.")

<sup>266</sup> Rysman Opening Report, ¶ 207.



- A game like Pokémon Go, which accounted for 2.06% of spend in the games category on Google Play in 2020 in the U.S.,<sup>267</sup> is specifically designed to take advantage of mobile functionality and would likely find shifting spend to non-mobile platforms difficult.
- The game Coin Master was the 1<sup>st</sup> ranked game by spend in 2020 (accounting for 2.88% of spend in the games category on Google Play in the U.S.) and is available only on iOS and Android.<sup>268</sup> Similarly, Call of Duty Mobile, which accounted for 0.9% of spend in the games category on Google Play in 2020 is available only on iOS and Android.<sup>269</sup> Other games in the top 200 by spend on Google Play in the game category in the U.S. which were available only on iOS and Android are Fate/Grand Order, Fire Emblem Heroes, Legendary Game of Heroes, and Disney Heroes: Battle Mode.<sup>270</sup> Because users typically single home between iOS and Android,<sup>271</sup> developers with games that are available only on mobile would find it difficult to effectively shift spend across platforms.

112. Finally, Dr. Gentzkow asserts that “Cloud gaming services are an important channel by which game developers can reach users without using traditional apps” as “[a]pp developers can access a larger gaming population, including a new base of users that would not have tried the game if they had to invest in a console or other device.”<sup>272</sup> While this might be hypothetically true, Cloud Gaming is still evolving and not expected to reach scale until the late

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<sup>267</sup> Rysman Rebuttal Report Backup Production. Only iOS and Android devices are included in its list of supported devices. *See* Pokémon Go Help Center, “Supported Devices,” available at <https://niantic.helpshift.com/hc/en/6-pokemon-go/faq/92-supported-devices/>.

<sup>268</sup> Rysman Rebuttal Report Backup Production. Moonactive, “Our Games,” available at <https://www.moonactive.com/>.

<sup>269</sup> Rysman Rebuttal Report Backup Production. Activision, “Call of Duty Mobile,” available at <https://www.activision.com/games/call-of-duty/call-of-duty-mobile>.

<sup>270</sup> Rysman Rebuttal Report Backup Production. “Fate Grand Order,” available at <https://fate-go.us/>; “Fire Emblem Heroes,” available at <https://fire-emblem-heroes.com/en/>; “Legendary Game of Heroes,” available at <http://legendary.n3twork.com/>; “Disney Heroes Battle Mode,” available at <https://www.disneyheroesgame.com/>.

<sup>271</sup> Rysman Opening Report, ¶ 330.

<sup>272</sup> Gentzkow Report, ¶ 208.

2020s<sup>273</sup> and Dr. Gentzkow provides no evidence (apart from limited isolated examples involving GeForce Now and Fortnite<sup>274</sup>) that cloud gaming has or will make a meaningful impact on how the vast majority of developers (who are not major cross-platform game developers) access Android users.<sup>275</sup>

5. *The Fact that Some Apps Are Free to Download and Others Are Monetized Through Ads or Other Means Does Not Alter My Opinions*

113. Dr. Tucker explains that Google’s monetization strategy for the Google Play store involves giving developers several options and allowing developers to choose not to monetize their apps.<sup>276</sup> She states that because of this Android App Distribution and Android In-App Billing Services on Android are not relevant antitrust markets and that I have not accounted for Google’s monetization strategy appropriately in my analysis.<sup>277</sup> As I explain below, the presence of apps with monetization strategies other than collecting payments for initial downloads or for access to in-app content does not change my opinions on market definition or market power.

114. Dr. Tucker explains that a large share of apps, “█████% of new apps ... in May 2021 did not monetize through the Google Play store.”<sup>278</sup> It should be noted that some of these apps may sell physical goods and services, and Google has chosen not to process payments for

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<sup>273</sup> Cloud gaming was not expected to become prevalent and reach scale until the late 2020s. *See*, Rysman Opening Report, ¶ 209. Google, “Game Change: The Future of Videogames,” May 2019, GOOG-PLAY-000231487-551, at 489.

<sup>274</sup> Gentzkow Report, ¶ 209.

<sup>275</sup> In a recent interview on the Decoder podcast, the CEO of Microsoft Gaming noted he believes cloud streaming in gaming would be of limited importance and expects consumers to continue buying and owning games for a long time to come. *See* Patel, Nilay, “Phil Spencer really wants you to know that Native Call of Duty will stay on PlayStation,” *The Verge*, November 15, 2022, available at <https://www.theverge.com/23459189/phil-spencer-microsoft-activision-call-of-duty-xbox-playstation-candy-crush-apple-fortnite-vr>.

<sup>276</sup> Tucker Report, ¶ 131.

<sup>277</sup> Tucker Report, ¶ 131 and ¶ 375.

<sup>278</sup> Tucker Report, ¶ 133.

tangible goods, such that these apps “did not monetize through the Google Play store.”<sup>279</sup> About [REDACTED] of the apps that make up the “[REDACTED] %” are ad supported, and Google therefore may also be able to monetize these apps through its advertising business.<sup>280</sup> Google may also stand to profit from the presence of these apps in the app store in other ways *e.g.*, by increasing the attractiveness of the Android OS driving business to Google Search and other Google products. However, Google’s incentives related to its broader business are not relevant to the question of how consumers and developers would substitute away from Android App Distribution in response to a price increase which is the core question for market definition. If consumers and developers are not able or willing to substitute away from Android App Distribution, then Google may be able to leverage that market power to engage in exclusionary conduct and charge supercompetitive prices.

115. Dr. Tucker devotes almost an entire section of her report to explaining that Google’s strategy for monetizing the Play store involves allowing developers to follow the “freemium model.”<sup>281</sup> This model may be part of how Google in the actual world was able to earn profits from the Play Store, but in the but-for world, Google would still have been able to allow free downloads and charge a commission, albeit a lower one (although its profits may have been less than what it earned in the world where it also engaged in exclusionary conduct). Overall, the fact that the “freemium model” is so important to developers is evidence that Google has market power in the relevant markets: if all developers were willing to forgo using Google Play for in-app billing services and become ad supported through Google or monetize their app in other ways, then Google would be forced to lower its commission, earn lower profits, and otherwise improve the terms trade.

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<sup>279</sup> Tucker Report, ¶ 133. Google, “Google Play Developer Distribution Agreement,” November 17, 2020, GOOG-PLAY-000053875-878.

*See also*, Play Console Help, “Payments,” available at <https://support.google.com/googleplay/androiddeveloper/answer/9858738>.

<sup>280</sup> Of the “95.5% of new apps released on the Google Play store in May 2021 that did not monetize through the Google Play store,” 53.12% were monetized through ads. Tucker Report, ¶ 133, Rysman Rebuttal Report Backup Production.

<sup>281</sup> Tucker Report, ¶¶ 132-147.

116. Dr. Tucker claims that the fact that other platforms use a “freemium” model is “evidence of the value provided by this fee structure as opposed to any reflection of monopoly power.”<sup>282</sup> The observation that other firms with potentially the same, less, or more market power offer products with similar terms of trade is not informative about whether Google possesses market power in the relevant antitrust markets. Posted prices are offered by firms of all types across many industries, some of which are competitive, which is likely explained by posted prices being a valuable way to structure trade in many markets. Firms having adopted posted prices is not evidence that they lack market power.

117. Dr. Tucker implies that my analysis does not “account for the interrelationships between all the free transactions enabled by the Google Play store and any subsequent services fees paid.”<sup>283</sup> However, my market definition matches the interrelationships between the markets. App developers and users choose whether to offer or download apps and in-app content on Android devices free or otherwise in the Android App Distribution market and developers pay a commission to Google to use its billing services in the Android In-App Billing Services market. The free downloads are included in the Android App Distribution Market, not “ignored” as Dr. Tucker implies – she later criticizes me for including them.<sup>284</sup>

118. By focusing on in-app billing services, Dr Tucker claims that I inappropriately ignore alternative monetization strategies for app developers.<sup>285</sup> However, analysis of switching between monetization strategies indicates that app developers usually use a single strategy and do not switch strategies often.

119. Exhibit 3 shows the percentage of apps relying on a single monetization strategy or multiple monetization strategies from August 2016 to December 2021. Exhibit 3 shows that apps generally choose a [REDACTED], with around [REDACTED] % of apps using [REDACTED] during the specified time period.

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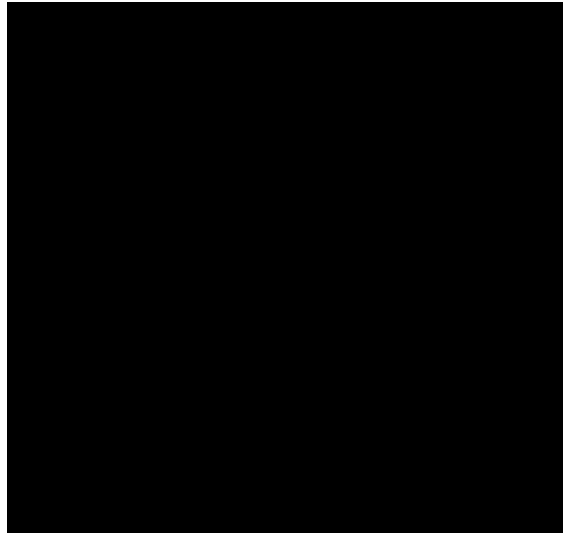
<sup>282</sup> Tucker Report, ¶ 147.

<sup>283</sup> Tucker Report, ¶ 18 and 149.

<sup>284</sup> Tucker Report, ¶ 149 and 375.

<sup>285</sup> Tucker Report, ¶ 33.

**Exhibit 3**  
**Number of Apps with Paid and Ad-Funded Strategies, August 2016 to December 2021**



*Notes:*

[REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]

[REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED]

*Sources:*

1. GOOG-PLAY-005535886.
2. GOOG-PLAY-010801688.
3. GOOG-PLAY-005535888.
4. Letter from Brian Rocca, counsel for Google, to Melinda R. Coolidge, “Re: In re Google Play Store Antitrust Litigation, No. 3:21-md-02981-JD (N.D. Cal.), Epic Games, Inc. v. Google LLC et al., No. 3:20-cv-05671-JD (N.D. Cal.), In re Google Play Consumer Antitrust Litigation, No. 3:20-cv-05761-JD (N.D. Cal.), In re Google Play Developer Antitrust Litigation, No. 3:20-cv-05792-JD (N.D. Cal.),” September 3, 2021.

120. Exhibit 4 shows the percentage of apps that switched between a paid and ad-supported monetization strategies from August 2016 to December 2021. As can be seen in the table, ■% of apps starting with a paid strategy and ■% of apps starting with an ad-funded strategy do not switch strategies.

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## Most Apps do not Switch Monetization Strategies, August 2016 to December 2021

[REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]  
[REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

1. GOOG-PLAY-005535886.
2. GOOG-PLAY-010801688.
3. GOOG-PLAY-005535888.
4. Letter from Brian Rocca, counsel for Google, to Melinda R. Coolidge, “Re: In re Google Play Store Antitrust Litigation, No. 3:21-md-02981-JD (N.D. Cal.), Epic Games, Inc. v. Google LLC et al., No. 3:20-cv-05671-JD (N.D. Cal.), In re Google Play Consumer Antitrust Litigation, No. 3:20-cv-05761-JD (N.D. Cal.), In re Google Play Developer Antitrust Litigation, No. 3:20-cv-05792-JD (N.D. Cal.),” September 3, 2021.

**NON-PARTY AND PARTY HIGHLY CONFIDENTIAL – OUTSIDE COUNSEL EYES ONLY**

Google's market power in the Android In-App Billing Services Market as evidenced by the supra-competitive prices and high margins that it has been able to maintain.<sup>286</sup>

**D. Dr. Tucker Fails to Show that Android App Distribution and In-App Billing Services are Not Relevant Antitrust Markets**

*1. Dr. Tucker's Claim that Android App Distribution and In-App Billing Services are Not Separate Relevant Antitrust Markets Misunderstands Key Points*

122. Dr. Tucker argues that Android app distribution and in-app billing services should be a single market.<sup>287</sup> However, she never argues that consumers or developers substitute between these markets. Rather, she makes a series of arguments that are not relevant for market definition.

*a) App Developers Monetization Strategies Do Not Affect My Market Definition*

123. First, Dr. Tucker criticizes the Android App Distribution Market because it “results in a market that consists almost entirely of free products.”<sup>288</sup> She says this is problematic because “this market definition fails to reflect important competitive realities regarding the Google Play store.”<sup>289</sup> This is flawed for several reasons. To begin with, market definition is meant to reflect how consumers substitute between products.<sup>290</sup> There is no requirement that products must be paid for. Dr. Tucker also seems to ignore that the Google Play Store operates with a two-sided strategy. It is unsurprising that Google might offer Android users prices of \$0

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<sup>286</sup> See Rysman Opening Report, § VI.C.

<sup>287</sup> Tucker Report, ¶¶ 373-374.

<sup>288</sup> Tucker Report, ¶ 375.

<sup>289</sup> Tucker Report, ¶ 375.

<sup>290</sup> Rysman Opening Report, ¶ 117. *U.S. Merger Guidelines*, § 4. The European Commission takes a consistent approach to market definition: “The question to be answered is whether the parties' customers would switch to readily available substitutes or to suppliers located elsewhere in response to a hypothetical small (in the range 5 % to 10 %) but permanent relative price increase in the products and areas being considered. If substitution were enough to make the price increase unprofitable because of the resulting loss of sales, additional substitutes and areas are included in the relevant market. This would be done until the set of products and geographical areas is such that small, permanent increases in relative prices would be profitable.” See Commission Notice, ¶ 17.



for most apps or even negative prices (consumer subsidies) in order to make the Play store more attractive to developers. Dr. Tucker and Dr. Gentzkow argue repeatedly that the “freemium” app model allows developers to maximize profits and, indeed, fault my SSNIP for not using transaction data for free apps that Google did not produce;<sup>291</sup> it would make no sense to find a market improper because it included these apps. Finally, Dr. Tucker fails to recognize that “free” apps may involve an exchange with the user of something besides monetary consideration. For instance, if we defined the relevant consumer market for social media apps such as Meta’s Facebook product, that might be made up entirely of “free” products, but only if economists ignore the data that users share to drive Facebook’s monetization. Dr. Tucker’s criticism misunderstands market definition for antitrust purposes.

124. Second, Dr. Tucker argues that in defining the Android App Distribution and the Android In-App Billing Services Markets my definitions do not capture the dynamics of products with in-app content. She states, “users can use apps such as Candy Crush Saga, Tinder, and Pandora for free today, but can easily substitute to making in-app purchases or purchase a subscription version in the future.”<sup>292</sup> However, this is exactly the behavior that my market definition captures. Consumers can choose to download apps in the Android App Distribution Market and then choose whether to consume in-app content. Separately, developers choose a vendor for In-App Billing Services as part of providing in-app content to consumers. Dr. Tucker generally references substitution in her report, for example that a “relevant antitrust market must include relevant transactions that are sufficiently substitutable,” but the substitution she describes here is not between products but rather whether or not to buy in-app content conditional on having downloaded the app.<sup>293</sup> Obviously, even a monopolist protected by a substantial barrier to entry must contend with consumers that can choose not to make purchases, and this is accounted for in my SSNIP.<sup>294</sup>

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<sup>291</sup> Tucker Report, ¶ 476 and Gentzkow Report, ¶ 80.

<sup>292</sup> Tucker Report, ¶ 376.

<sup>293</sup> Tucker Report, ¶ 376.

<sup>294</sup> Rysman Opening Report, ¶ 224.

b) Google's Monetization Strategy Is Not Directly Relevant to Market Definition

125. Dr. Tucker states that “[s]eparating app downloads and other kinds of digital content transactions into separate markets does not make sense because the relationship between the two is important to Google’s competitive strategy for the Google Play store.”<sup>295</sup> This is related to a contention that Dr. Tucker makes throughout her rebuttal report (noted above), that only by looking at the entire ecosystem of the Android operating system can we understand Google’s constraints on competition.<sup>296</sup> For instance, Dr. Tucker states that “Separating Google’s Android ecosystem into ... discrete markets means that Plaintiffs’ expert reports define away the Android ecosystem’s competition with Apple and other alternatives that competitively constrain Android and the Google Play store.”<sup>297</sup> She also claims that the monetization strategy of the producer of a product should inform market definition.<sup>298</sup> She is not explicit about what is meant by a “monetization strategy” and it is not a standard term in economics, but presumably, she means of that if a firm offers one product for free and collects revenue on another product, those products should be in the same market.

126. However, the purpose of market definition in an antitrust analysis is to understand demand substitution.<sup>299</sup> It is not to understand the ecosystem or the monetization strategy of the firms. The DOJ/FTC merger guidelines do not contain the terms “ecosystem” or “monetization strategy.”<sup>300</sup> At the market definition stage, it is appropriate to begin the analysis with the products involved in the conduct, study the relevant forces of demand substitution, and use that

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<sup>295</sup> Tucker Report, ¶¶ 376-377.

<sup>296</sup> See Tucker Report, ¶ 14. See also Tucker Report, ¶¶ 32-33 and 116-117 and generally §§ III.C, IV.A, IV.B.1, and VI.B.

<sup>297</sup> Tucker Report, ¶ 32.

<sup>298</sup> Tucker Report, ¶ 39 (“The Rysman, Schwartz, Singer and Tadelis Reports’ approach to defining a separate market for Android in-app billing services is flawed. It ignores that the service fee for select digital content transactions on the Google Play store is a monetization strategy that helps fund the entire ecosystem and all the value unlocked within it. It also ignores that as a monetization strategy it unlocks value for users and developers, and the Google Play store is only paid if it creates sufficient value.”)

<sup>299</sup> Rysman Opening Report, ¶ 117.

<sup>300</sup> See U.S. Merger Guidelines. The term “business strategy” also does not appear.

information to define relevant markets.<sup>301</sup> The potential implications of other related products that are not relevant demand substitutes, *i.e.*, other parts of the ecosystem, should be considered at a later stage in the analysis to the extent they would affect the analysis of market power or competitive effects.<sup>302</sup> One article in the literature explicitly cautions against uncritically relying on documents and testimony that discuss the business strategies of the firms, explaining that “there is no reason to expect that the concept of market employed by business executives when discussing issues of business strategy or marketing, would be the same as the concept of an “antitrust market” or “relevant market” defined for the purpose of antitrust analysis.”<sup>303</sup> Business strategies may account for many more factors than the level of demand substitution relevant to defining antitrust markets.

127. A well-known example is *United States v Microsoft* (1999), which illustrates why considering the “ecosystem” in market definition would lead to defining markets that do not seem to follow the basic economic principles of market definition. Presumably, Dr. Tucker would find that for Microsoft in the 1990’s, Windows and Internet Explorer (the browser for

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<sup>301</sup> Rysman Opening Report, ¶ 117. U.S. Horizontal Merger Guidelines, § 4.1 (“When a product sold by one merging firm (Product A) competes against one or more products sold by the other merging firm, the Agencies define a relevant product market around Product A to evaluate the importance of that competition”). By analogy in a conduct case one starts with the products that are alleged to have been effected by the conduct.

<sup>302</sup> See, e.g., U.S. Department of Justice and the Federal Trade Commission, “Horizontal Merger Guidelines,” August 19, 2010, available at <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010>, (hereafter, “*U.S. Merger Guidelines*”), § 4 (“Market definition focuses solely on demand substitution factors ... the responsive actions of supplies are also important in competitive analysis. They are considered in these Guidelines in the sections addressing the identification of market participants, the measurement of market shares, the analysis of competitive effects, and entry”); Baker, Jonathan B., “Market definition: An analytical overview,” *Antitrust LJ*, Vol 74, 2007, pp. 129-173, available at <https://heinonline.org/HOL/LandingPage?handle=hein.journals/antil74&div=8&id=&page=>, at p 173 (“To avoid confusion and clarify the inquiry, market definition should be limited to the consideration of demand substitution; other economic forces like supply substitution can readily and appropriately be accounted for in other steps of antitrust analysis.”).

<sup>303</sup> Baker, Jonathan, “Market Definition: An Analytical Overview,” *Antitrust Law Journal*, No. 1., 2007, pp. 129-173, at 139 (“Accordingly, there is no reason to expect that the concept of market employed by business executives when discussing issues of business strategy or marketing, whether in testimony or documents prepared for business purposes, would be the same as the concept of an “antitrust market” or “relevant market” defined for the purpose of antitrust analysis. The informed views of executives as to the nature and magnitude of likely buyer substitution are relevant to antitrust market delineation, as discussed below, but the specifications of markets they adopt for business purposes unrelated to antitrust analysis should not control the definition of the market for antitrust purposes.”).

Windows) were part of the same “ecosystem” and that Microsoft’s monetization strategy for Internet Explorer (which was offered for free) could not be understood without understanding Microsoft’s revenue from Windows, Office, and other products. However, that did not prevent the court from finding a distinct operating system market.<sup>304</sup> The OS market did not include browsers such as Internet Explorer and Netscape Navigator, even though they were linked in terms of ecosystem and monetization.<sup>305</sup> The reason browsers and operating systems are not in the same market is simple: browsers are not substitutes for operating systems.

c) In-App Billing Services and App Distribution are Complements for Developers

128. In criticizing the separation of app distribution and in-app services, Dr. Tucker does not quantify the importance of substitution between these two markets, and she does not challenge the idea that they are complements.<sup>306</sup> Products are complements when the utility of a given quantity of two products is higher than the sum of having the same quantity of the products separately. That is, complementary products are more valuable when consumed together than apart.<sup>307</sup> An example is coffee and milk. If a consumer prefers to have eight ounces of coffee with an ounce of milk to having eight ounces of coffee by itself and an ounce of milk by itself,

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<sup>304</sup> See “Court’s Findings of Fact,” *United States v. Microsoft Corporation*, Case No. 98-1232 (TPJ), available at <https://www.justice.gov/atr/us-v-microsoft-courts-findings-fact#ii>, at ¶¶ II.A.1.a.

<sup>305</sup> See “Court’s Findings of Fact,” *United States v. Microsoft Corporation*, Case No. 98-1232 (TPJ), available at <https://www.justice.gov/atr/us-v-microsoft-courts-findings-fact#ii>, at ¶¶ II.B.1.

<sup>306</sup> As noted above, Dr. Tucker briefly discusses the possibility of consumer substitution by consumers in ¶ 376, but this “substitution” is not substitution between products. In my Opening Report, I explained that developers view Android App Distribution and Android In-App Billing Services as complements. See Rysman Opening Report, ¶¶ 192, 251.

<sup>307</sup> Samuelson, Paul, “Complementarity: An Essay on The 40th Anniversary of the Hicks-Allen Revolution in Demand Theory,” *Journal of Economic Literature*, Vol. 12, No. 4, 1974, pp. 1255-1289. Samuelson (1974) reviews different definitions of complements. My definition is based on Equation 8 in Samuelson (1974), which he ascribes to Hicks (1932). An alternative approach would be to define complements by cross-price elasticities. However, as Samuelson (1974) points out, cross-price elasticities can be misleading in the context of multiple goods, some of which are complements and some of which are substitutes. Samuelson provides a simple example: Consider a consumer that chooses between coffee and tea and always adds milk to either. We would probably regard coffee and tea as substitutes to each other and milk as a complement to both tea and coffee. However, if the consumer always consumes more milk with tea than coffee, an increase in the price of coffee can lead to an increase in the consumption of milk, a misleading cross-price elasticity for complements.

the products are complements. Most consumers would not like the inverse: eight ounces of milk with one ounce of coffee. The two products are complements, not substitutes.

129. The characteristics of app distribution and in-app billing services suggests that they are also complements. For both consumers and developers, the provision of in-app billing services makes apps more valuable than if apps were constrained to have all content and fees exchanged at app distribution. Similarly, in-app billing services are not even feasible without initial distribution of an app. Thus, app distribution and in-app services make each other more valuable and are complements. Antitrust relevant markets typically include substitutes, but do not need to include complements.<sup>308</sup> Dr. Tucker never engages with this basic point.

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130. This evidence therefore suggests it is appropriate to consider Android App Distribution and In-App Billing Services as separate markets. As explained in my Opening Report, Google has tied Android App Distribution (tying product) to In-App Billing Services (tied product).<sup>309</sup> Therefore, Google forces developers to purchase these two products together and pay the same commission when they sell downloads, in-app content, or subscriptions. However, as I explained in my Opening Report, In-App Billing Services is a distinct market from Android App Distribution,<sup>310</sup> and understanding this market is important to being able to understand the competitive effects of Google's conduct. Therefore, it is not inconsistent, despite

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<sup>308</sup> Markets do sometimes include complements, for example, cluster markets, which are when several product markets are studied together (e.g., hospital in-patient services). *See, e.g.*, Baker (2007) at p. 158 ("The cluster market approach is inappropriate for market definition because clusters include products and services that are not demand substitutes (or supply substitutes). It can be defended as a matter of analytical convenience: there is no need to define separate markets for a larger number of individual hospital services, for example, when market shares and entry conditions are similar for each, or when data limitations will effectively require that the same proxy (such as the number of hospital beds) be employed to estimate the market share for each individual service.") Cluster markets are sometimes justified because "sellers offer buyers substantial transaction cost saving from one-stop shopping," *see* Baker (2007) citing to Ian Ayres, *Rationalizing Antitrust Cluster Markets*, 95 YLJ 109 (Nov. 1985). However, as I explained in my Opening Report, developers have alternatives for in-app billing services and would use them when given a choice. *See* Rysman Opening Report, ¶¶ 245-249 and 252-259.

<sup>309</sup> Rysman Opening Report, § VIII.A.2.

<sup>310</sup> Rysman Opening Report, § V.D.2.

Dr. Tucker's claims,<sup>311</sup> to use the same commission when analyzing the two markets, since that is how Google structures the price it charges to developers in the actual world.

131. Moreover, my Opening Report is explicit that my SSNIP analysis asked "whether the market is broader than App Distribution and In-App Billing Services on Android."<sup>312</sup> But there is no contradiction between finding that the market is no broader than these two markets together and analyzing the markets separately as narrower markets for the purposes of understanding Google's market power and the competitive effects of the alleged conduct.<sup>313</sup> My SSNIP analysis shows that my two proposed markets are not too narrow.<sup>314</sup> My further qualitative analysis of evidence of separate demand shows that the two markets are separate.<sup>315</sup>

2. *Dr. Tucker's Proposed Facilitation of Digital Content Transactions Market is Overly Broad*

132. Dr. Tucker's stance on the relevant product market is overly broad. She states that the "relevant product is the facilitation of digital content transactions."<sup>316</sup> As stated, it is not restricted to mobile computing or even household customers. For instance, enterprise customers make digital content transactions when they purchase a new module in Salesforce or Oracle, or purchase software as a service on cloud platforms such as Microsoft Azure or Amazon Web

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<sup>311</sup> See Tucker Report, ¶ 379.

<sup>312</sup> Rysman Opening Report, ¶ 223.

<sup>313</sup> U.S. Merger Guidelines § 4.1.1. I also discuss this in the context of Dr. Tucker's claims regarding the relevant geographic market in § III.E.

<sup>314</sup> Rysman Opening Report, § V.C.5.

<sup>315</sup> Rysman Opening Report, § V.D.2.

<sup>316</sup> Tucker Report, § III.B.1. While Dr. Tucker does not use the term market, this appears to be her suggested relevant product market. In ¶ 9, Dr. Tucker states the product definition slightly differently, that "the product in this case is the facilitation of digital content transactions—paid and unpaid—between users and developers." Adding the concept of users and developers to the definition does not rule out the examples I provide here. Third-party software developers exist for platforms such as Salesforce, Azure, and Amazon Web Services. The data center housing the New York Stock Exchange can provide data feeds to other exchanges, who might be thought of as developers in this context. See e.g., Salesforce, "appexchange," <https://appexchange.salesforce.com/appxStore?type=App&d=cta-body-promo-85>. Microsoft, "App Service," available at <https://azure.microsoft.com/en-us/products/app-service/#overview>. Amazon, "What is SaaS," available at <https://aws.amazon.com/solutions/saas/>.

Services.<sup>317</sup> High-frequency traders make digital content transactions when they purchase a data feed from the New York Stock Exchange.<sup>318</sup> It is unclear why Dr. Tucker would include these transactions in the relevant market for the Google Play Store, or how we could read her definition to exclude them.

133. Although Dr. Tucker provides a clear statement of her definition of the geographic market, she fails to do so for the product market and, as written, provides an indefensibly large relevant product market. The appropriate starting place for market definition is the products relevant to the alleged conduct, and from there market definition proceeds by adding products to the extent there is sufficient demand substitution to warrant their inclusion.<sup>319</sup> This is the process that I followed in my Opening Report, and Dr. Tucker reverses the usual process in her analysis.

134. Dr. Tucker's reliance on the concept of an ecosystem to define markets seems to contribute to her overly broad definition of the relevant product. For example, it is obvious that the Android ecosystem includes the Android operating system,<sup>320</sup> and indeed, she claims that operating systems should be in the relevant market.<sup>321</sup> Typically, an operating system operates a device, such as a mobile phone, and provides an interface for an application, such as an app store, to manipulate output such as the screen and speaker. Dr. Tucker does not explain how an operating system could substitute for an app store or vice versa.

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<sup>317</sup> See, e.g., "What Does Salesforce Do?," Salesforce, November 16, 2022, available at <https://www.salesforce.com/blog/what-does-salesforce-do/?bc=OTH> and "What is AWS?," Amazon Web Services, available at <https://aws.amazon.com/what-is-aws/>.

<sup>318</sup> See "Data & Tech," New York Stock Exchange, available at <https://www.nyse.com/data-and-tech>

<sup>319</sup> Rysman Opening Report, § V.A.1.

<sup>320</sup> Tucker Report, ¶ 34: "mobile operating systems are one component of competition between ecosystems."

<sup>321</sup> Tucker Report, ¶ 324: "Indeed, the fact that Plaintiffs' expert reports use the same evidence regarding users' switching between Apple and Android devices to define both the licensable OS market and the app distribution market suggests that these are not separate markets but rather that both the OS and the app store are part of one ecosystem that consumers are choosing." Note that she refers here to other Plaintiffs' expert reports, as I do not define a licensable OS market.



135. Even more striking is that Dr. Tucker appears to include physical mobile phones as part of the Android ecosystem.<sup>322</sup> Dr. Tucker does not define what she means by “digital transactions,” in her statement about the product market definition, but surely, mobile phones are not digital transactions. Thus, although she criticizes plaintiffs’ experts for defining relevant markets that divide up the “ecosystem,” she contradicts herself by dividing up the ecosystem herself.

*3. Dr. Tucker’s Criticisms of the Android In-App Billing Services Market are Incorrect*

136. Dr. Tucker criticizes the Android In-App Billing Services Market, because she claims that users can buy digital content outside of the Google Play Store, such that this is a substitute for in-app billing services. She also claims that by focusing on average spending, I have ignored important differences across users, and she claims that the billing services market is only a market for payment processing.

137. Dr. Tucker points to the fact that users can make payments outside of the Google Play Store, such as by being directed to or going to a developers website, web-application, or other platform.<sup>323</sup> I have addressed whether substitution to these other channels is likely to constrain the hypothetical monopolist of Android App Distribution or Android In-App Billing Services, or for that matter Google, in Sections III.B and III.C. She states that “[m]any users may still prefer to pay via the Google Play store but that may simply reflect consumer preferences for the security and controls it offers rather than any evidence of friction associated with payments on other platforms.”<sup>324</sup> But that is not evidence that Google lacks market power or that a hypothetical monopolist in this market would be constrained from raising price by a SSNIP. The

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<sup>322</sup> Tucker Report, ¶ 323: “By building the Android ecosystem and providing handset manufacturers with a high-quality operating system that is freely available, Google has enabled handset manufacturers as part of that mobile ecosystem to effectively compete with the Apple’s tightly interconnected ecosystem, providing a foundation for interactions between digital content users and developers.”

<sup>323</sup> Tucker Report, ¶ 406.

<sup>324</sup> Tucker Report, ¶ 406-407.

In-App Billing Services market is a one-sided market with developers as the buyers.<sup>325</sup> If Google offers a product that developers need because users value the product, that creates market power for Google or the hypothetical monopolist. Therefore, those preferences are exactly what is relevant to market definition.

138. Dr. Tucker also claims that because my SSNIP analysis is based on average spending it ignores certain high value users who might be more sensitive to a change in app prices.<sup>326</sup> However, as I explained in Section III.C.1.a), her analysis of switching across phone price bands only shows that Android users who switch to iPhone are likely to have switched to a more expensive phone.<sup>327</sup> Further, Dr. Tucker provides no other convincing evidence that high value users are more likely to switch than other users. It may be the case that they are more locked into their chosen smart mobile devices brand, and potentially less willing to deal with frictions that might arise if developers tried to steer them to make purchases elsewhere.

139. Dr. Tucker also claims that I have failed to consider post-download services that Google provides in my proposed markets.<sup>328</sup> This is not correct. The services Dr. Tucker cites—“fixing bugs, patching security issues, importing redesigns or launching new features”—are offered equally for free apps and paid or freemium apps alike.<sup>329</sup> Google Play’s accounting controller quantifies the standalone selling price attributable to supporting app updates at [REDACTED] and explained that the costs of supporting these services are “[REDACTED].”<sup>330</sup> Developers might prefer to push their own app updates directly to users, and Dr. Tucker does not appropriately consider whether Google’s mandatory insertion of itself into app updates is something any developer values, let alone at a 30% commission.

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<sup>325</sup> See Rysman Opening Report, § V.D.3.

<sup>326</sup> Tucker Report, ¶ 415.

<sup>327</sup> Tucker Report, Table 8.

<sup>328</sup> Tucker Report, ¶¶ 382-83

<sup>329</sup> Tucker Report, ¶ 382

<sup>330</sup> See DiVento (Google) Deposition, pp. 72-73 (testifying that Google “[REDACTED]” to provide updates and “that the standalone selling price as it related to facilitating access to digital content updates is [REDACTED] for purposes of revenue recognition.”)

140. Dr. Tucker incorrectly claims that I say that the market for billing services is just payment processing,<sup>331</sup> but I explained in my Opening Report that at the core of in-app billing services is an SDK or API that helps enable the payment for and unlocking of in-app content, which may be offered in a bundle of complementary services that can include invoicing, payment history, refund processing, and subscription renewal services.<sup>332</sup>

**E. Dr. Tucker's Claims that the Relevant Geographic Market is the United States Does Not Alter My Opinion of the Relevant Geographic Market**

141. In my Opening Report, I conclude that the relevant geographic market within which to assess Google's challenged conduct is worldwide (excluding China).<sup>333</sup> For Android App Distribution, this is based on the fact that the MADA allows OEMs to sell their Android devices with the Google Play Store pre-installed in most parts of the world, with developers therefore able to reach a global audience via the Google Play Store.<sup>334</sup> I also find that billing service providers offer their services worldwide (including Adyen, PayPal and Stripe), with the Google Play Store distributing apps in over 135 countries (with developers using Google Play Billing in countries where it is available).<sup>335</sup> I exclude China as the Google Play Store (and Google Play Billing API that comes with GMS) and many western services<sup>336</sup> are unavailable in China (other apps stores are instead popular, including Tencent My App, 360 Mobile Assistant, and Baidu Mobile Assistant, who use different billing service providers including AliPay and WeChat Pay).<sup>337</sup>

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<sup>331</sup> Tucker Report, § VI.C.2. and ¶ 378.

<sup>332</sup> Rysman Opening Report, ¶ 238.

<sup>333</sup> Rysman Opening Report, §§ V.C.6 and V.D.5.

<sup>334</sup> Rysman Opening Report, ¶ 232.

<sup>335</sup> Rysman Opening Report, ¶ 275.

<sup>336</sup> See, e.g., Square, "International Availability," <https://squareup.com/help/us/en/article/4956-international-availability> (accessed Dec. 17, 2022) ("Card payment acceptance with the Square app is currently available in the US, Canada, Australia, Japan, the United Kingdom, Republic of Ireland, France and Spain. We currently don't support payment card processing outside of these countries . . .").

<sup>337</sup> Rysman Opening Report, ¶ 233 & ¶ 276.

142. By contrast, Dr. Tucker contends the Google Play Store competes in a narrower geographic market limited to the United States.<sup>338</sup> Dr. Tucker’s conclusion is based on the fact that “[a]pp stores are generally designed for users in specific countries who generally speak a particular language, use a particular currency and have particular interests”<sup>339</sup> as well as “country-specific or region-specific competitive conditions and constraints” for users and developers.<sup>340</sup> Google’s at issue conduct is worldwide (excluding China) and therefore this is the starting place for my analysis of geographic market definition.<sup>341</sup>

143. Dr. Tucker also does not grapple with the possibility that focusing on demand-side substitution when undertaking geographic market definition risks defining markets too narrowly. For example, when discussing geographic segmentation for telecommunications markets, the OECD acknowledged that “[a] consumer is unlikely to move to another geographic area due to a price increase (or degradation of quality) since the cost of re-location will probably far outweigh any saving made on fixed-line services. Hence, geographic demand-side substitution is usually a weak constraint so that if this approach were pursued it would lead to very narrow markets being defined that would be impractical to analyze.”<sup>342</sup>

144. In addition, despite arguing for a narrow U.S. market, Dr. Tucker cites data and evidence corresponding to a worldwide (excluding China) market. For example:

- Dr. Tucker cites a Google memo “Play vs iOS Performance – overall 2017 summary” that shows “[c]onsumer spend on iOS exceeded consumer spend on Google Play by ~8.5B in 2017...this number is excluding China.”<sup>343</sup>

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<sup>338</sup> Tucker Report, § VII.B.

<sup>339</sup> Tucker Report, ¶ 420.

<sup>340</sup> Tucker Report, ¶ 431.

<sup>341</sup> See e.g. Rysman Opening Report, ¶¶ 232 and 275.

<sup>342</sup> OECD, “Geographically Segmented Regulation for Telecommunications,” *OECD Digital Economy Papers*, No. 173, at p. 19.

<sup>343</sup> Tucker Report, ¶ 211 and footnote 341.

- Dr Tucker cites Sensor Tower data that in 2020 showed “81% of worldwide (excluding China) app downloads from both the Google Play store and the Apple App Store were made via the Google Play store, but consumer spending on the Google Play store accounted for only 43% of consumer spending on the two stores.”<sup>344</sup>
- Dr. Tucker cites third party app store data that finds that: “[i]n December 2018, smartphones with at least one pre-installed app store accounted for 59% of worldwide (excluding China) active Android phones and tablets. By July 2021, this figure had increased to 66% of worldwide (excluding China) active Android phones and tablets.”<sup>345</sup>
- Dr. Tucker cites that “[t]he Samsung Galaxy Store preinstallation shares worldwide (excluding China) were 88% and 97% in December 2018 and July 2021, respectively.”<sup>346</sup>
- Dr. Tucker cites data that “[i]n December 2020, 66% of the Android devices in the United States and 79% worldwide (excluding China) had at least one app installed from a non-Google Play store source.”<sup>347</sup>

145. Nonetheless, my conclusions on Google’s monopoly power in the Android App Distribution Market do not hinge on whether the market is worldwide (excluding China) or a narrower market focusing on the United States. My Opening Report frequently provided evidence of Google’s market power in the United States, in addition to evidence of worldwide market power in my proposed markets. For example:

- Exhibit 35 shows that Google charges a supracompetitive commission of close to 30% on U.S. consumer transactions,<sup>348</sup>

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<sup>344</sup> Tucker Report, ¶ 211.

<sup>345</sup> Tucker Report, footnote 451.

<sup>346</sup> Tucker Report, footnote 452.

<sup>347</sup> Tucker Report, ¶ 271.

<sup>348</sup> Rysman Opening Report, Exhibit 35.

- My comparison of Google’s supracompetitive commission in the Google Play Store to various competitive benchmarks are all relevant for the U.S. market (e.g., Microsoft Store’s 15% commission and Epic Games’ Store commission of 12%);<sup>349</sup>
- Google’s change in revenue sharing with MNOs is based on U.S. carriers Verizon and AT&T;<sup>350</sup>
- Google admits in internal documents that Play Store “dominates in **all countries**,” has “[o]verwhelming market share,” and is “the preeminent distribution platform for Android.” (emphasis added);<sup>351</sup>
- Google Play is pre-installed on nearly 100% of Android smart mobile devices, both globally and domestically;<sup>352</sup>
- U.S. data on sideloading suggests that sideloading was just █% of app installs in 2016;<sup>353</sup> and
- Google creating substantial barriers to entry/expansion through a large installed base of users that already use the Play Store to download apps and signing MADAs with OEMs applies equally to a narrower U.S. market.<sup>354</sup>

146. Similarly, evidence that suggests that Google has monopoly power in the worldwide (excluding China) Android In-App Billing Services Market applies similarly to a narrower U.S. geographic market:

- Google’s supracompetitive commission and discounts to certain developers applies to U.S. Android users;<sup>355</sup> and

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<sup>349</sup> Rysman Opening Report, ¶ 288.

<sup>350</sup> Rysman Opening Report, ¶ 289 and Exhibit 37.

<sup>351</sup> Rysman Opening Report, ¶ 302.

<sup>352</sup> Rysman Opening Report, ¶ 303 and Exhibit 40.

<sup>353</sup> Rysman Opening Report, Exhibit 43.

<sup>354</sup> Rysman Opening Report, ¶¶ 318 - 326.

<sup>355</sup> Rysman Opening Report, ¶¶ 348 - 352.

- Google’s contractual agreements with developers, limiting the extent to which developers can choose their own billing service provider for in-app transactions applies equally to U.S. developers;<sup>356</sup>

#### **IV. Google has Monopoly Power in the Relevant Antitrust Markets**

##### **A. Overview**

147. In my Opening Report, I presented a market power analysis, following standard methods in antitrust economics, in which I presented both direct and indirect evidence demonstrating Google has monopoly power in the relevant antitrust markets.<sup>357</sup>

148. By contrast, Google’s expert Dr. Tucker claims that Google does not have market power, a finding derived from her overly broad definition of a relevant market, and she presents various criticisms of the market power analysis offered in my Opening Report. Dr. Tucker criticizes my calculation of Google’s market share on the basis that the Android App Distribution and In-App Billing Services Markets are defined too narrowly<sup>358</sup> and contends that, because it is *possible* for the barriers to entry created by indirect network effects to be overcome, Google does not benefit from the market power those indirect network effects confer.<sup>359</sup> Dr. Tucker also claims that a proper interpretation of Google’s commission rate would lead to the conclusion that Google faces competitive constraints<sup>360</sup> and further asserts that it is wrong to interpret Google’s high margins as indicative of market power.<sup>361</sup> Finally, she contends Google’s innovation and expanding output in the Google Play Store are evidence that Google does not have monopoly power.<sup>362</sup>

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<sup>356</sup> Rysman Opening Report, § IV and ¶¶ 357 - 360.

<sup>357</sup> Rysman Opening Report, § VI.

<sup>358</sup> Tucker Report, § VIII.H.

<sup>359</sup> Tucker Report, § VIII.E.

<sup>360</sup> Tucker Report, § VIII.C. and § VIII.D.

<sup>361</sup> Tucker Report, § VIII.I.

<sup>362</sup> Tucker Report, § VIII.F. and § VIII.G.



149. I have considered Dr. Tucker's criticisms, and, as I explain below, I find her criticisms are without merit. In particular:

- Dr. Tucker's analysis of Google's commission compared to other app stores and over time does not account for the fact that only a small proportion of Google Play Store's revenue has been affected, and when discussing the declining price she fails to take into account whether the competitive price may also have fallen over the same period. Her analysis also fails to account for the impact of increased regulatory scrutiny on Google's commission. I explain in more detail issues with her analysis of Google's commission rate in Section IV.B.1.
- In Section IV.B.2, I explain that when analyzing output and innovation over time, Dr. Tucker also fails to establish a competitive benchmark and instead relies on Google's actual output and innovation, thereby making her analysis uninformative.
- Next, as I explain in Section IV.B.3, while Dr. Tucker claims that barriers to entry from network effects could be overcome under certain conditions, her analysis is focused on the potential for these barriers to be overcome and does not show they actually have been overcome or that this potential was sufficient throughout the period to discipline Google.
- Her structural analysis suffers from her overly broad market definition and is therefore not relevant, as I explain in Section IV.D.
- Finally, in Section IV.B.4, I explain how her claims that Google's margins do not reflect all of the costs associated with the broader Android ecosystem or the costs that were required for Google to innovate simply reflect her incorrectly broad definition of the relevant market.
- I also address Dr. Tucker's claim that sideloading, pre-installation, and alternative app stores limit Google's market power (*see* Section IV.C).IV.C

150. I conclude that Dr. Tucker's criticisms do not change my opinion that Google has monopoly power in Android App Distribution and Android In-App Billing Services. I review the most salient issues in Dr. Tucker's analysis below.

**B. Dr. Tucker Misinterprets Evidence Related to Google's Market Power**

*1. Similarity in Pricing Across App Stores and Over Time is Not Evidence of Restraints on Google's Market Power*

151. Dr. Tucker claims Google, and other App stores have charged similar prices and have discounted prices in response to each other's pricing decisions.<sup>363</sup> First, it is worth highlighting that my analysis shows that Google's price reductions affected only a very small proportion of Google Play Store revenue, with Google's commission on paid transactions is still averaging 28% in 2021.<sup>364</sup> However, there are several additional inconsistencies in Dr. Tucker's evidence. For example, Dr. Tucker suggests that "Google's service fee rate has declined over time" and that "[t]his evidence is inconsistent with the claim that Google has monopoly power."<sup>365</sup> But a downward trending price in isolation does not suggest an absence of market power. What matters is the price relative to the competitive price (which may not be static over time and could have fallen faster and farther).<sup>366</sup> The fact that Google's commission remains above those of its most relevant competitors is an indicator of market power.<sup>367</sup> Moreover, when Google's commission rate has declined, the price reductions came after or around the time of related private and public enforcement actions such as this case; thus, any price reductions do not indicate a response to competitive pressures but instead a response to increasing regulatory and legal scrutiny.<sup>368</sup> Dr. Tucker does not even mention the pendency of these investigations as a factor relevant to her analysis.

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<sup>363</sup> Tucker Report, *see e.g.*, ¶¶ 452-4727, Table 10 and Table 11.

<sup>364</sup> Rysman Rebuttal Report Backup Production. *See also* Rysman Opening Report, Exhibit 35.

<sup>365</sup> Tucker Report, ¶ 454.

<sup>366</sup> *See e.g.*, a paper cited by Dr. Tucker notes that "[i]f the competitive price is known, then a comparison of the prevailing market price and the competitive price will allow a direct inference about market competitiveness." Klotz, Thomas J., "Monopoly Power: Use, Proof and Relationship to Anticompetitive Effects in Section 2 Cases," Working Paper, 2008, pp. 1-42, at pp. 14-15.

<sup>367</sup> *See* Rysman Opening Report, Exhibit 69.

<sup>368</sup> Rysman Opening Report, ¶ 286.

152. Dr. Tucker also suggests that one should “compare Google’s service fee rates for the Google Play store to the rates charged to sell other products, including products that require a substantial amount of innovation and creativity by the firms that develop them” and that “[o]ther digital content distribution platforms charge fees that are equal to or higher than Google’s service fees for the Google Play Store.”<sup>369</sup> These include Amazon Prime Video Direct, Kindle, and Nook, which charge fees in the 30-65% range, and Apple iTunes which charges 27-37%.<sup>370</sup> However, while all these examples may be within Dr. Tucker’s overly broad market, the production process and demand for books, movies, and music may be different from apps and, thus, these may not be comparable benchmarks and Dr. Tucker does not provide a detailed analysis that would establish these products as comparable. Further, I note that Dr. Tucker’s analysis of service fees (as present in Dr. Tucker’s Table 10) includes the Samsung Galaxy Store (30%) and the Amazon Appstore (20% for <\$1m, 30% for >\$1m, and 20% for movie and TV subscriptions).<sup>371</sup> However, a deeper analysis of these headline commission rates shows small competitors can be much more aggressive with discounts off the headline rates. In Exhibit 5, below I compare Google’s average commission rates (across paid app downloads, in-app digital content and subscriptions), with Amazon Appstore and Samsung Galaxy Store’s net commission rates (*i.e.*, net of any discounts developers receive off the headline rates).

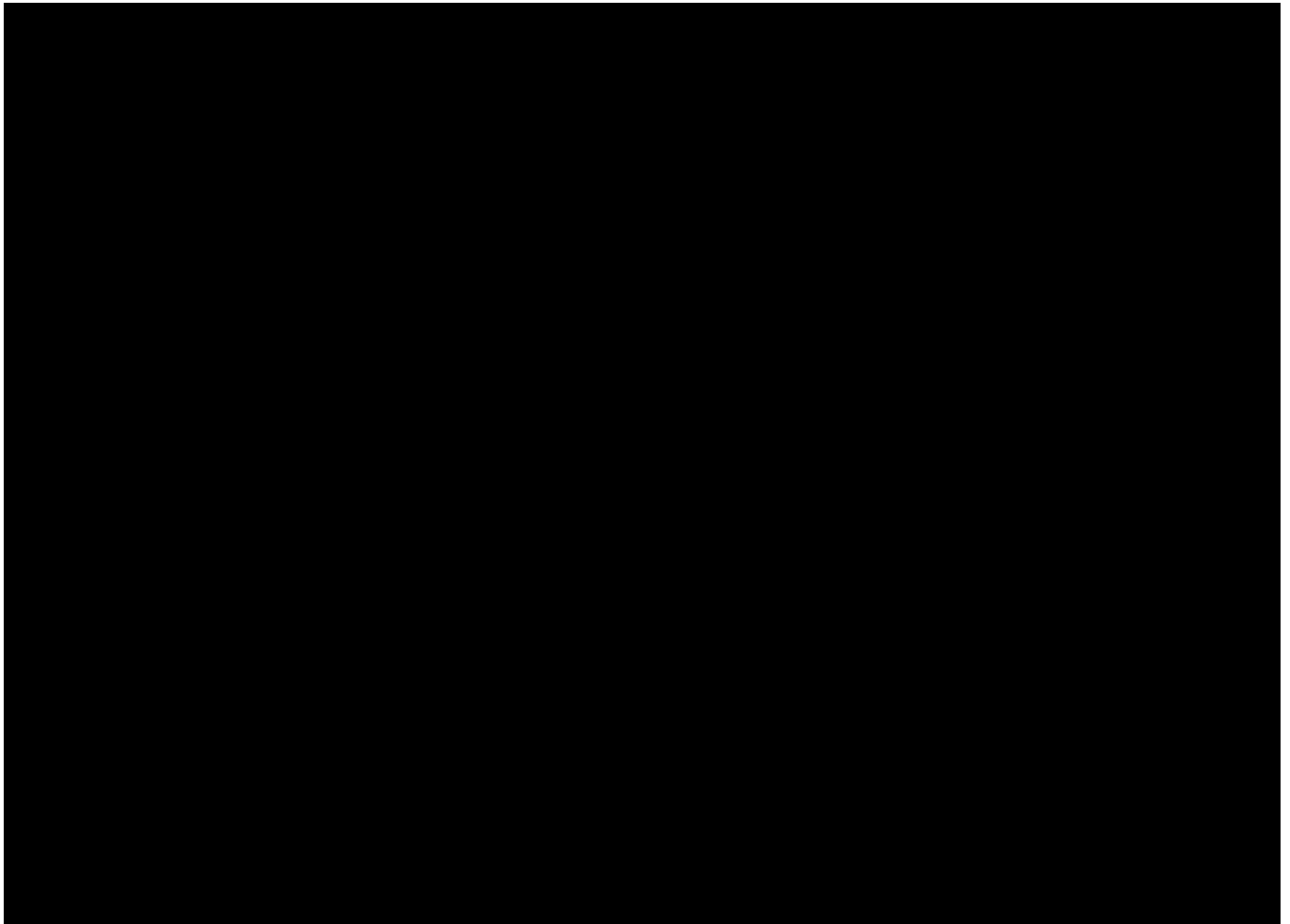
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<sup>369</sup> Tucker Report, ¶ 460.

<sup>370</sup> Tucker Report, ¶ 460.

<sup>371</sup> Tucker Report, Table 10.

**Exhibit 5**



*Notes:*

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

*Sources:*

1. Rysman Production, Exhibit 35.

[REDACTED]

[REDACTED]

153. This analysis shows that from 2018 to 2021, despite high headline (gross) commission rates as noted above, the [REDACTED] and [REDACTED] [REDACTED] This

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suggests that the headline rates used by Dr. Tucker are misleading and a full analysis needs to account for the discounts developers received from smaller app store competitors.

154. Dr. Tucker also says that Google charged a 30% commission when Google did not have market power.<sup>372</sup> However, Dr. Tucker does not explain why Google's prices were higher at launch than competitors such as SlideME and potential Android App Distribution entrants such as Qualcomm.<sup>373</sup> Exhibit 6 below shows that Android Market charged a higher commission relative to other Android app stores and potential app stores at the time of its release.

**Exhibit 6**  
**Android Market Charged Higher Commissions Than Other Android App Stores Around the Time of its Release**

<b>Android App Store</b>	<b>Date Store was Available on Android</b>	<b>Standard Commissions for Downloads or IAPs (At Launch)</b>
Qualcomm's BREW Delivery System	2001 (Did Not Enter Android)	20%
GetJar	At the Beginning of Android	0%
Android Market	10/22/2008	30%
	10/23/2008	2-5% on App Sales
SlideME	Paid Apps: 2/9/2009	0% on IAPs
Qualcomm's Plaza Retail	5/17/2009 (Did Not Enter Android)	20%
		No Paid Apps
F-Droid	9/29/2010	0% on IAPs

*Notes:*

1. I understand that Plaza Retail grew out of Qualcomm's BREW Delivery System but list it separately for the avoidance of doubt.

*Sources:*

1. Vogelsang (Qualcomm) Deposition, p. 32:8-9 ("Q. When did Qualcomm launch BREW? A. As I recall, it was in 2001.").
2. Vogelsang (Qualcomm) Deposition, pp. 34-36 (explaining that the standard revenue sharing terms before 2005 "were 80 percent to the developer, 10 percent to the operator, 10 to . . . Qualcomm" but acknowledging that MNOs could impose a retail markup and there was variation "depending upon the region and the unique needs of the operators there").
3. "Qualcomm sees growth for Brew MP despite rivals' success," available at <https://www.mobileworldlive.com/latest-stories/qualcomm-sees-growth-for-brew-mp-despite-rivals-success> ("Rob Chandhok, president of Qualcomm's Internet Services division, said the two platforms are targeting very different markets. "Brew MP and Android really aren't competitive – they are really in different tiers," he said.")

<sup>372</sup> Tucker Report, ¶ 454.

<sup>373</sup> See Exhibit 6 below.

4. See Dury (GetJar) Deposition, p. 29 (“Q. Do you think that would have been before 2009? A. GetJar supported the distribution of Android applications downloaded from the . . . GetJar website at the very beginning of Android, before the app store offering from Google was called Google Play, it was originally called Android Market.”).
5. Dury (GetJar) Deposition, p. 30 (“Q. And just to follow up on something you said earlier, since your tenure at GetJar began, did GetJar ever charge the user to download and install an application? A. No. Q. Did GetJar charge developers anything to publish apps on the GetJar app store or on the GetJar website? A. Any publisher could publish an app on the GetJar website for free. Q. Now, even though the apps listed in GetJar were free, could developers sell in-app content in those apps under GetJar[’s] terms? A. Yes. Q. Did GetJar take any of the revenue from those sales? A. No.”).
6. Play Console Help, “Service fees,” available at <https://support.google.com/googleplay/androiddeveloper/answer/112622>
7. Rysman Opening Report n.571 (citing Google, “Android Market: Now available for users,” October 22, 2008, available at <https://android-developers.googleblog.com/2008/10/android-market-now-available-for-users.html> and Chu, Eric, “In-app Billing Launched on Android Market,” Android Developers, March 29, 2011, available at <https://android-developers.googleblog.com/2011/03/in-app-billing-launched-on-android.html#:~:text=Today%2C%20we're%20pleased%20to,purchases%20from%20within%20your%20apps.> ).
8. SlideME, “A Brief History of the Android App Store Race,” (Feb. 16, 2009), <http://slideme.org/blog/brief-history-android-app-store-race> (“On October 23rd, [2008,] SlideME releases SAM, our mobile client for the G1. Google still has their Android Market closed to the general developer community, so we see a spike in content stocked at SlideME, as well as G1 users hungry for new apps that aren't on the Android Market.”). SlideME, “Release of SAM 2.3 and Support for Paid Applications,” (Feb. 9, 2009), <http://slideme.org/blog/slideme-release-sam-23-and-support-paid-applications> (“SlideME is pleased to announce support for paid applications with our release of SAM 2.3, the first billing solution for Android that includes a mobile client.”).
9. SlideME, “Release of SAM 2.3 and Support for Paid Applications,” (Feb. 9, 2009), <http://slideme.org/blog/slideme-release-sam-23-and-support-paid-applications> (“SlideME is pleased to announce support for paid applications with our release of SAM 2.3, the first billing solution for Android that includes a mobile client.”).
10. See Christopolous (SlideME) Deposition, pp. 209-210 (Q. Well, but is it your memory that it was somewhere between 95 or 98 percent, some high percentage of the transaction revenue would go to the developer, right? . . . A. Yes, some high percentage, but I don’t know how we calculated this. . . .”); SlideME, “Release of SAM 2.3 and Support For Paid Applications,” (Feb. 9, 2009), <http://slideme.org/blog/slideme-release-sam-23-and-support-paid-applications> (advertising “[h]igh payout rates to content providers/developers ~98%”); SlideME, “SlideME Revenue Share,” (Sept. 30, 2009), <http://slideme.org/blog/slideme-revenue-share> (“At SlideME, we introduced the highest payouts for developers in the industry, with typical payouts of 95%. The remaining 5% went directly to the payment processor. Our position has always been not to make money on downloads.”). I understand that, beginning with this second press release, SlideME began charging a typical commission of 20% for direct carrier billing and 20% plus \$0.10 for other forms of payment, which was equal to Google’s commission at the \$1 mark and lower than Google’s commission for any price above that at this time. See SlideME, “Rate Schedule,” available at <http://slideme.org/rate-schedule>.
11. Christopolous Deposition, pp. 215-16 (“Q. . . .When a developer used their own in-app billing SDK, would SlideME get a share of the revenue for transactions in that app? A. No, they wouldn’t because we wouldn’t be able to. Q. Would SlideME have allowed developers to use their in-app billing SDK? A. Developers were allowed to use third-party billing SDKs and monetize a hundred percent without us monetizing because SlideME’s interest was content, app developers without causing too much friction.”).
12. Qualcomm, “App Store Pioneer to Take Mobile Retailing to Any Device on Any Network with Plaza Retail,” (May 17, 2009), *available at*: <https://www.qualcomm.com/news/releases/2009/05/app-store-pioneer-take-mobile-retailing-any-device-any-network-plaza-retail>.
13. Vogelsang (Qualcomm) Deposition, pp. 34-36 (“were the terms that you described of 80 percent revenue to the developer, from the wholesale price, 10 percent to the operator, 10 percent to Qualcomm still the general terms Qualcomm was offering through the end of your role as head of product management for Plaza Retail? . . . A. As I recall, that's the case.”)

14. F-Droid, “F-Droid Is Here,” (Sept. 29, 2010), <https://f-droid.org/2010/09/29/f-droid-is-here.html> (“F-Droid is dedicated to Free and Open Source (FOSS) software on the Android platform.”).
15. Because F-Droid “is an installable catalogue of FOSS (Free and Open Source Software) applications for the Android platform,” I understand that it by definition does not include paid apps and therefore, there is no commission on the sale of paid apps or in-app content that F-Droid collects. F-Droid, “What is F-Droid?,” <https://f-droid.org/en/> (accessed Dec. 17, 2022). “F-Droid is a non-profit volunteer project” that solicits donations. F-Droid, “About,” <https://f-droid.org/en/about/> (accessed Dec. 17, 2022). I understand that F-Droid permits free apps to offer paid in-app content but does not offer its own in-app billing solution. *See* F-Droid, Forum, In-app Purchases (Sept. 2015), <https://f-droid.org/forums/topic/in-app-purchases/>.

155. Dr. Tucker also mentions that I did not highlight Aptoide’s competitive positioning, where Aptoide states that developers “[g]et a minimum of 75% payout rate on in-app purchases in comparison to 70% or even 50% you get with other app distributors,” which Dr. Tucker suggests “highlights the existence of higher service fees than the 30% service fee for the Google Play store.”<sup>374</sup> But Dr. Tucker cites only Aptoide’s marketing material on their website and she does not provide any examples of app stores charging those rates.<sup>375</sup>

156. Finally, I would note that comparisons in my Opening Report to benchmark commission rates should be viewed as only one of several factors on which I base my conclusions about Google’s market power.

2. *Dr. Tucker’s Analysis of Output and Innovation Fails to Compare Google’s Conduct with a Competitive But-for World*

157. Dr. Tucker presents a series of charts depicting purchases and spending on the Play Store as evidence that “the output of digital content transactions has increased since Google launched its app store and has continued to increase.”<sup>376</sup> Dr. Tucker also cites to various improvements that Google has made to the Play Store as evidence of innovation.<sup>377</sup> These analyses fail to demonstrate that Google lacks market power in the relevant markets. There are many reasons why output may have increased in the actual world, but what is important is that it may have increased faster in a competitive world where Google had less market power or did not

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<sup>374</sup> Tucker Report, ¶ 472.

<sup>375</sup> *See*, Aptoide, “Distribute apps to over 300M users,” available at <https://en.aptoide.com/company/developers>.

<sup>376</sup> Tucker Report, ¶ 516.

<sup>377</sup> Tucker Report, § VIII.F.



actively suppress competition. An appropriate analysis of whether Google has market power based on output would need to determine if Google's output reflected the competitive level, not just whether it changed or even increased over time. Even monopolists can be expected to innovate and improve their products, but they may have less incentive to innovate than in a more competitive marketplace. I discuss in more detail the problems with Dr. Tucker's analysis below.

158. By comparing output overtime, Dr. Tucker appears to implicitly assume that the level of output that would prevail in a competitive benchmark is effectively the level that occurred at the beginning of her figures in 2012.<sup>378</sup> Dr. Tucker offers no analysis that shows output in 2012 represents a competitive benchmark for the relevant markets. In my Opening Report, for instance, I found that in 2012 Android's share of the Licensable Smart Mobile OS market was nearly 90% worldwide excluding China (or 96% in the U.S.).<sup>379</sup> This evidence suggests that 2012 may not be a valid *competitive* benchmark for output for the Play Store, even accepting the notion that Android OS shares are a relevant measure of Google's power in my proposed markets (and they are not).

159. Dr. Tucker's analyses of spending and purchases overtime are also not compelling because they do not control for various other changes that have occurred during this time period. In particular, they do not control for increases in the demand for Android App Distribution of In-App Billing Services that arise for reasons outside of Google's control. As noted in my Opening Report the share of Americans who own a smartphone has increased from 35% to 85% from 2011 to 2021.<sup>380</sup> Some of the increase in spending on Play Store must be attributed to an expanding userbase. Further, not all measures of output have been uniformly expanding over the same time period. I showed in my Opening Report, that the number of developers and number of applications available on the Google Play Store has increased although the upward trend has

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<sup>378</sup> Tucker Report, Figures 44-47.

<sup>379</sup> Rysman Opening Report, ¶¶ 37 – 40, and Exhibits 2-5.

<sup>380</sup> Rysman Opening Report, ¶ 30.

slowed in recent years.<sup>381</sup> Therefore, it cannot be concluded that Google lacks market power based on the increase in consumer spending over time.

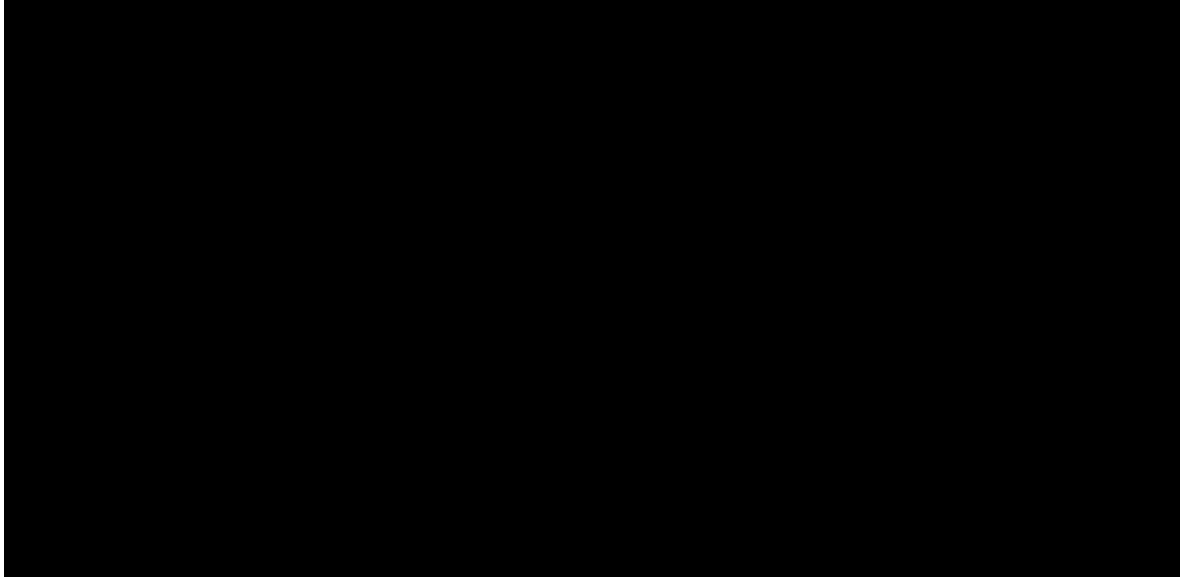
160. In fact, as I explained in my Opening Report, in a more competitive market where Google charged a lower commission, a model of competition in the relevant markets indicates that the number of unique apps would have been 20% higher, over the period from August 16, 2016 to May 31, 2022.<sup>382</sup> Now instead I use my variety effect model to show the increase in the total number of apps in the but-for world according to that model by year in Exhibit 7. I have also updated Exhibit 70 of my Opening Report below in Exhibit 8 to show the increase in quantity in the but-for world when I use the total welfare damages model that allows both prices and variety to change. These predicted increases in variety and output, illustrate why it is important to undertake a comparison against a competitive benchmark.

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<sup>381</sup> Rysman Opening Report, Exhibit 46 and 47.

<sup>382</sup> Rysman Opening Report, ¶ 488 and Appendix F E.11.

**Exhibit 7**  
**Total Number of Apps Available Absent Google's Anticompetitive Restrictions**  
**August 16, 2016 – December 31 2021**

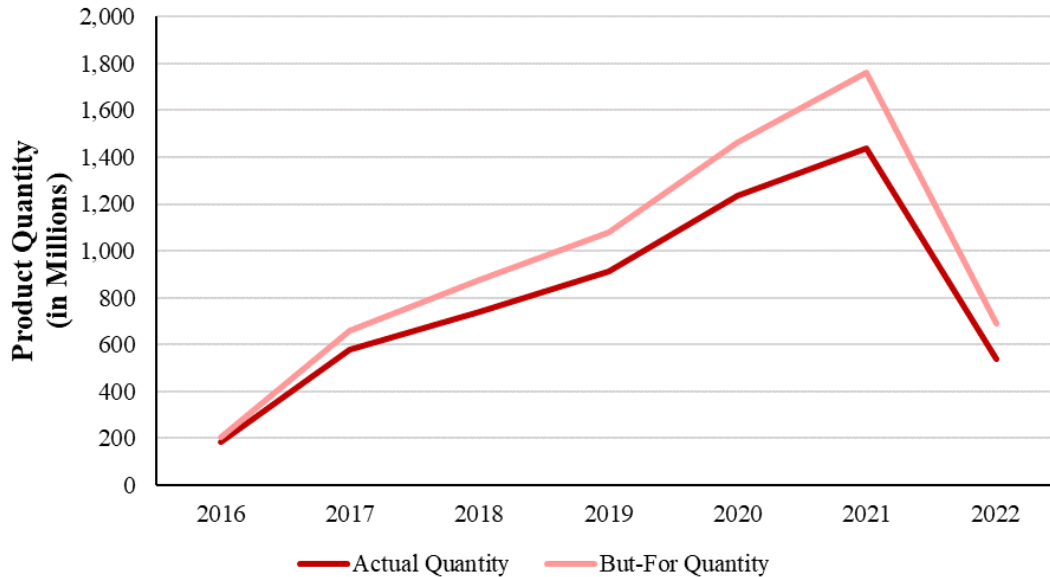


*Notes:*

1. See Rysman Opening Report, Appendix F where I develop a model underlying my damages calculations. The model provides a mechanism through which the lower commission translates into an increased supply of unique apps and in-app content.
2. This estimation was performed under the assumption that both the number of apps changes but the price of apps does not change in response to a change in the commission.

*Source:* Google Transactions Data.

**Exhibit 8**  
**Increased Output Absent Google's Anticompetitive Restrictions**  
**Using Total Welfare Model**  
**August 16, 2016 – May 31 2022**



*Notes:*

1. See Rysman Opening Report, Appendix F.
2. This estimation was performed under the assumption that both the number of apps and price of apps changes in response to a change in the commission.

*Source:* Google Transactions Data.

161. Dr. Tucker's arguments regarding innovation suffer from the same basic issues as her arguments regarding output. She does not compare Google's level of innovation to that which would have occurred in a competitive but-for world. I discuss Google's innovation further in Section V.G.1 when I discuss harm and competitive effects.

3. *Contrary to Dr. Tucker's Claims, Network Effects Do Create Barriers to Entry*

162. In my Opening Report, I argue that the Play Store benefits from network effects, which create a barrier to entry to new app stores.<sup>383</sup> App stores are attractive to consumers in part because of how many apps they offer and are attractive to developers in part because of how many consumers shop there. New app stores find it difficult to reach comparable scale because of this circular dynamic or “chicken and egg” problem. The basic theory of network effects is widely understood in economics and clearly recognized by industry participants in markets with operating systems and app stores.<sup>384</sup>

163. Dr. Tucker's attempt to undercut the argument that network effects create a barrier to entry, fails to recognize important elements of the markets under study.

164. Dr. Tucker's apparent position that barriers to entry need to be insurmountable to confer market power colors her analysis of the academic literature on network effects. She argues that multi-homing “mitigate[s]” the importance of network effects.<sup>385</sup> She argues that “localized” competition “**can** impose competitive constraints on platforms [emphasis added].”<sup>386</sup> And Dr. Tucker says that network effects “**can also** lead to negative feedback loops [emphasis added].”<sup>387</sup> However, in each case, these claims do not go so far as to say that network effects are made irrelevant as potential barriers to entry by these factors, only that there are ways that barriers to entry from network effects **can** be mitigated.

165. In support of the fact that the “winner take all” aspect of platforms are mitigated when platform users multi-home, she cites to Armstrong (2006), which studies two configurations, “both groups single home” and “one group single-homes while the other multi-

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<sup>383</sup> Rysman Opening Report, ¶¶ 318-326.

<sup>384</sup> Rysman Opening Report, § V.A.2.

<sup>385</sup> Tucker Report, ¶ 498.

<sup>386</sup> Tucker Report, ¶ 500.

<sup>387</sup> Tucker Report, ¶ 502.

homes.”<sup>388</sup> Of the two, the second is the most relevant because developers typically multi-home while consumers typically single-home.<sup>389</sup> Armstrong terms this setting “competitive bottlenecks” and finds that it gives the platform “monopoly power” over the “multi-homing side” because they must use the platform to access the “single-homing” customers.<sup>390</sup> Armstrong’s model finds that this leads to “high prices being charged to the multihoming side, and there will be too few agents on this side.” This prediction directly contradicts Dr. Tucker’s position that multi-homing would mitigate Google’s market power.<sup>391</sup>

166. Dr. Tucker seems to have in mind that both users and developers multi-home as her examples of Uber and Lyft, and American Express, Visa, and MasterCard all have this feature.<sup>392</sup> As evidence for multi-homing, Dr. Tucker cites to analyses of gaming platforms that she does in Section V.C. of her report. I do not dispute that many developers will develop apps for multiple platforms, but the evidence presented in my Opening Report indicates that users do not tend to multi-home across multiple smart mobile device ecosystems.<sup>393</sup> Also if we focus on gaming, as Dr. Tucker does, it is not clear that multi-homing across gaming platforms is possible for many games or common for users more broadly than in the few examples, like Fortnite, that Dr. Tucker cites in her report.<sup>394</sup> Further, Dr. Tucker’s own analysis of multi-homing by Fortnite users shows that about 88% of Fortnite’s revenue from non-mobile sources is coming from gaming consoles or PCs.<sup>395</sup> There are likely many mobile app and mobile game developers that

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<sup>388</sup> Tucker Report, ¶ 498 and footnote 946.

<sup>389</sup> Rysman Opening Report, ¶ 46.

<sup>390</sup> Armstrong, Mark, “Competition in two-sided markets,” *The RAND Journal of Economics*, Vol. 37, No. 3, 2006, pp. 668-691 (hereafter “Armstrong (2006)”) at p. 669.

<sup>391</sup> Another paper she cites Liu et al. (2022) points out that “specific homing patterns of buyers and sellers do not automatically lead to specific market outcomes because one also has to take into account multihoming users’ preferences for transacting on certain platforms and not others.” Liu, Chunchun, Tat-How Teh, Julian Wright, and Junjie Zhou, “Multihoming and oligopolistic platform competition,” forthcoming in *American Economic Journal*, 2022, pp. 1-49, at p. 2.

<sup>392</sup> Tucker Report, ¶ 499.

<sup>393</sup> Rysman Opening Report, ¶¶ 46 and 330.

<sup>394</sup> Tucker Report, § V.C.3.

<sup>395</sup> Tucker Report, Figure 28.B.

would not be interested in reaching consumers on these platforms. I discuss gaming platforms and multi-homing in more detail in Section III.C.4 and III.C.1.a) of this report.

167. Dr. Tucker argues that “‘localized’ competition” can create a constraint on Google, by which she means gaming platforms competing with Google Play.<sup>396</sup> I explain elsewhere that gaming platforms are not in the relevant market, and even if they were, they are not relevant during the entire period under review.<sup>397</sup> Setting aside whether gaming platforms are in the relevant market, her argument related to “‘localized’ competition” does not make sense. She provides a convoluted story of how competing against gaming platforms could cause Google to “invest both in transactions supported by the ‘localized’ competitor and other transactions on the platform.”<sup>398</sup> That is, “localized” competition can cause all participants on a platform to experience the benefits of competition. She does not provide any examples of what investments Google has made in response to gaming, and she notably leaves Google’s commission out of her analysis. It is obvious from the record that Google can offer a discount on its commission to sensitive developers and continue to charge high prices to the rest of the developers.<sup>399</sup> That is, even under the most favorable interpretation, “localized” competition has not displaced Google as a platform and cannot do so, and has not led Google to lower its commission for “non-local” participants, who remain subject to the market power due to network effects.

168. Dr. Tucker also provides examples of apps that experienced network effects but that were eventually displaced by other apps. At best, this establishes that network effects are not insurmountable, about which there is no debate.

169. Finally, I would also add that network effects were a significant concern regarding a potential challenge from carriers. An email from Tom Moss (Google’s head of Japan New Business Developer) to Andy Rubin in 2009, stated, “[i]f we can get carriers comfortable with Market for the near future, there will come a tipping point where consumer demand will be

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<sup>396</sup> Tucker Report, ¶ 500.

<sup>397</sup> See § III.C.4. Rysman Opening Report, ¶¶ 200-210.

<sup>398</sup> Tucker Report, ¶ 501.

<sup>399</sup> Rysman Opening Report, ¶ 286, and Tucker Report, Table 3.



so strong we can set different revenue models and carriers will be unable to compete with their own offerings because their own offerings will be so limited in comparison.”<sup>400</sup> This suggests that Google knew that network effects would create a tipping point for its market power, beyond which carriers would find it difficult to complete.

#### 4. *Google’s Margins Are Evidence of Market Power*

170. Dr. Tucker suggests that the Plaintiff’s experts do not account for the Google Play Store being “a key part of helping the Android ecosystem compete and the revenue earned by Google on the Google Play store is used to fund the wider Android ecosystem” and in the P&L statements “do not capture all the investments made by Google in the wider Android ecosystem to attract users and developers.”<sup>401</sup> Further, she argues that because Google is innovating and incurring significant fixed costs operating the Google Play Store, it is not appropriate to infer monopoly power from its margins.<sup>402</sup>

171. Dr. Tucker claims that the revenues from the Google Play Store are used to fund the wider Android ecosystem, and that there are costs to support the wider Android ecosystem that are not included in the Play store P&L.<sup>403</sup> Dr. Tucker provides no method to appropriately allocate these revenues and costs. It is worth noting [REDACTED] (see Section V.G.3). It is therefore not clear how to link the revenues of Play to the overall costs like R&D of Android as a whole. In my Opening Report, I analyzed both the gross margin and operating margin, which include [REDACTED] and found both to be evidence of market power.<sup>404</sup> As I explained in my Opening Report, “[w]hile accounting profits can deviate from economic profits and it is important to

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<sup>400</sup> Email from Tom Moss, Google, to Andy Rubin, Former Google VP and Android Founder, “Subject: Re: Your thoughts on Android Market,” February 3, 2009, GOOG-PLAY-001423609-610, at 609.

<sup>401</sup> Tucker Report, ¶ 531.

<sup>402</sup> Tucker Report, ¶ 535-536.

<sup>403</sup> Tucker Report, ¶ 531.

<sup>404</sup> Rysman Opening Report, Exhibit 38.

consider other evidence, I find that Google's high accounting margins are consistent with the other evidence I provide of Google's market power."<sup>405</sup>

172. In addition, Dr. Tucker argues that the Google Play Store's margins are not specific to Android App Distribution or Android In-App Billing Services markets.<sup>406</sup> However, Google has protected/extended this market power by tying in-app billing services to app distribution. Therefore, the Google Play Store's margins (which includes the In-App Billing Services Market), is a relevant indicator of Google's market power in app distribution. I would also note that Dr. Tucker does not quantify what in her view would be the correct margins for measuring Google's market power in any proposed market. Finally, Dr. Tucker contends that the Plaintiff experts "do not accurately capture Google's early losses on Android."<sup>407</sup> These include losses on Android of \$51.7 million and \$102.4 million in 2009 and 2010 respectively, and \$126 million and \$72 million in 2011 and 2012.<sup>408</sup> While Dr. Tucker states that "[t]he Google Play store operated at a loss in each year from 2009 through 2012," the losses she cites to for 2009 and 2010 are for Android not for Play.<sup>409</sup>

173. However, accounting for these losses during the period I analyze in my Opening Report (2013-2021) makes limited difference to the operating profits. Exhibit 9 below shows Exhibit 38 from my Opening Report adjusted for these earlier losses by dividing the total loss of \$352 million, over the period from 2013 to 2021 (which totaled \$29.35 billion before the adjustment). For example, in 2021, the operating profit margin decreases from ■% to ■% after accounting for earlier losses. Dr. Tucker therefore overstates the impact of these early claimed losses.<sup>410</sup>

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<sup>405</sup> Rysman Opening Report, ¶ 297. *See also* Rysman Opening Report, ¶ 294, explaining how high margins are evidence of a firm's ability to set prices above a competitive level.

<sup>406</sup> Tucker Report, ¶ 532.

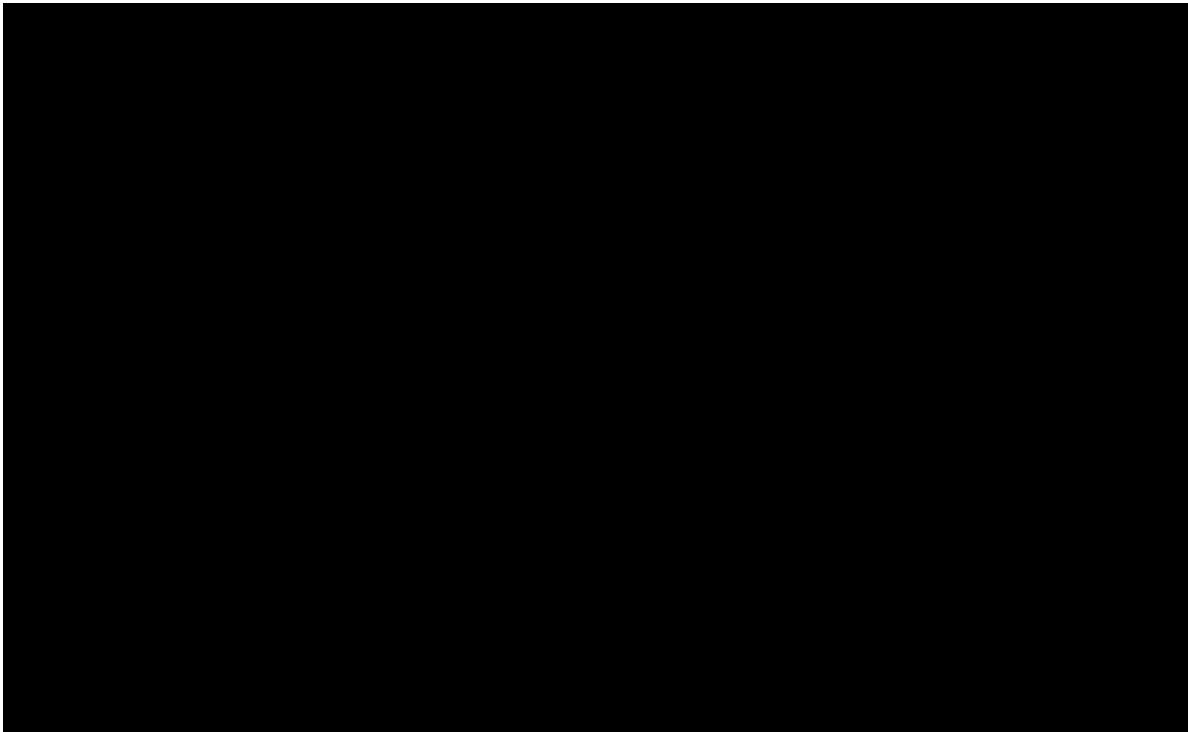
<sup>407</sup> Tucker Report, ¶ 541.

<sup>408</sup> Tucker Report, ¶ 541.

<sup>409</sup> Google, "Android OC Quarterly Review - Q2 2010," July 12, 2010, GOOG-PLAY-001490474- 493, at 478; Google, "Android OC Quarterly Review - Q2 2011," July 26, 2011, GOOG-PLAY-005570952.R-972.R, at 958.R.

<sup>410</sup> Tucker Report, ¶ 541.

**Exhibit 9**  
**Google Play Revenues, Costs, and Profit Margins, 2013 – 2021**  
**(Adjusted for 2009-2012 Android losses)**



*Source:* See Rysman Opening Report, Exhibit 38 and accompanying notes/sources; Tucker Report, ¶ 541.

174. Finally, I note that Dr. Skinner asserts that “Google Play internal management P&Ls do not fully reflect the joint and common costs of those Alphabet resources that benefit Google Play” and that “[n]one of Plaintiffs’ expert economists address this factor.”<sup>411</sup> He also claims that “the available evidence suggests that these additional costs are substantial.”<sup>412</sup> However, the preceding analysis already demonstrates that re-allocating the earlier losses (likely due to investment in the Google Play Store) makes a negligible impact on Google’s operating profit margin. To allocate the other “additional costs benefiting Google Play” that Dr. Skinner calls substantial, he does not quantify these joint / common costs or allocate them to the Play Store with any detailed analysis. Moreover, Dr. Skinner does not propose what in his view

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<sup>411</sup> Skinner Report, ¶ 173.

<sup>412</sup> Skinner Report, ¶ 173.

should be the correct profit margins on which to assess Google’s market power.<sup>413</sup> I therefore maintain my opinion that Google’s margins are consistent with the other evidence I provide of Google’s market power.<sup>414</sup>

**C. Sideloading, Pre-Installation, and Alternative App Stores Do Not Constrain Google’s Market Power in the Relevant Markets**

175. Dr. Tucker suggests there are other ways the Google Play Store competes for users and developers to transact digital content, including pre-installed apps, sideloaded apps and alternative apps stores.<sup>415</sup>

176. First, Dr. Tucker suggests that the ability of developers and users to sideload apps is a “competitive feature of the Android ecosystem” and that “numerous Android users and developers use sideloading.”<sup>416</sup> Dr Tucker’s evidence shows that “66% of the Android devices in the United States and 79% worldwide (excluding China) had at least one app installed from a non-Google Play store source” and that the proportion of non-Google Play apps installed from “unknown sources” are as high as 7% in the U.S. and 41% worldwide (excluding China).<sup>417</sup> As I explain in further detail in Section V.E.3, these statistics are misleading and focus only whether **at least one** app on a user’s device was sideloaded.<sup>418</sup> This does not show how frequently Android users actually use sideloading as an alternative to the Play Store.

177. Second, Dr. Tucker notes that there are “numerous Android app stores in addition to the Google Play Store,” including “handset manufacturer app stores such as the Samsung Galaxy Store and Xiaomi GetApps and third-party app stores such as Amazon Appstore, as well

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<sup>413</sup> Skinner Report, § VIII.A.1.

<sup>414</sup> Rysman Opening Report, ¶ 297.

<sup>415</sup> Tucker Report, ¶ 251.

<sup>416</sup> Tucker Report, ¶ 271.

<sup>417</sup> Tucker Report, ¶ 271.

<sup>418</sup> Dr. Tucker also claims that data I relied on “suggests that only 10% of apps ... are user-installed via the Google Playstore,” and that “75% of apps in the underlying data source are pre-installed apps.” *See* Tucker Report, ¶ 392. I discuss this data and why my use of it was appropriate in § V.E.3.

as APKMirror, APKPure and F-Droid.”<sup>419</sup> This does not change my opinion: I acknowledged a Google document listing some of these competitors in my Opening Report.<sup>420</sup> Dr. Tucker does not provides any market share estimates for these other stores; indeed, their market share is constrained by the challenged Google conduct, and the various measures of Google Play’s market share I provide in my Opening Report refute the notion that these other app stores meaningfully constrain Google in the status quo. Xiaomi GetApps is available only on Xiaomi devices, and Google sought out a revenue sharing agreement with Xiaomi for exclusive preloading of the Google Play Store.<sup>421</sup> The Amazon Appstore was foreclosed from expansion by Google’s conduct.<sup>422</sup> Google sought to buy off the Samsung Galaxy Store, only to abandon the deal.<sup>423</sup> APKMirror does not offer paid apps or support for in-app billing<sup>424</sup> and, because it is web-based, is subject to the “unknown sources” warning the first time a user seeks to download an app from their website using a particular browser on an Android smart mobile device.

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<sup>419</sup> Tucker Report, ¶ 253.

<sup>420</sup> Rysman Opening Report, ¶ 154.

<sup>421</sup> Google, “ACPX/BC Review: Google Distribution Agreements Framework,” (June 2019), GOOG-PLAY-000457156.R, at -198.R (proposing revenue share in exchange for “Play exclusivity” on Xiaomi devices, among other terms).

<sup>422</sup> Rysman Opening Report, ¶¶ 51, 151 footnote 351, 319 footnote 673, 413, 427, 432, 459-462, 508. *See also* Google, “Amazon Top Partner Review,” March 17, 2016, GOOG-PLAY-004494298.R-325.R, at 317.R (“Distribution: Downloading Amazon Underground is still quite complex – it is NOT available in Play Store, so a user has to sideload this app.”); Email from Christian Cramer, Google, to Kristin Reinke, Google, “Materials from 2017 Q2 BFR Review that cancelled,” July 8, 2017, GOOG-PLAY-009209478 (“Amazon is aggressively growing its app store in Japan targeting High Value Users with discounts, which could pose significant risk for our JP Play business in the long run – their activity is in very early stages and there is a lot of discussion how much impact they can have as users have to side-load their app to their Android phones which is cumbersome.”); Google, “Amazon App Store: Financial Risk Assessment,” June 2017, GOOG-PLAY-000571992-040, at 011, 014, and 016 (modeling \$1 billion in revenue losses to Google from Japan and 25 other top grossing countries “IF AMZN STARTS GETTING PRELOADED ONTO DEVICES!”); Cramer (Google) Deposition, p. 437 (“Q. Okay. So your team, in conducting the Amazon risk assessment that is in this deck, Plaintiff’s Exhibit 452, considered preloading as one of the ways that users could ultimately make an in-app purchase in the Amazon app store, right? A. Right, that’s always the case.”).

<sup>423</sup> Rysman Opening Report, ¶¶ 400-407.

<sup>424</sup> APKMirror, “FAQ,” available at [https://www.apkmirror.com/faq/#Does\\_APKMirrorcom\\_host\\_paid\\_or\\_pirated\\_apps](https://www.apkmirror.com/faq/#Does_APKMirrorcom_host_paid_or_pirated_apps) (explaining that “APKMirror.com has a no-piracy policy and does not host paid apps,” with some “rare exceptions” for updates to paid apps in beta testing);

178. Third, Dr. Tucker’s data on pre-installed apps is misleading.<sup>425</sup> Dr. Tucker mentions that “[d]ata from 2018 to 2021 confirms the substitutability of other Android app stores for the Google Play store,” including the Samsung Galaxy store being “preinstalled on 96% of Samsung phones and tablets in the United States as of December 2018 and 98% as of July 2021.”<sup>426</sup> Dr. Tucker and Dr. Gentzkow also both claim that 62% or 65% of Android devices come with an alternative app store pre-loaded on the device.<sup>427</sup> However, these metrics just show that these stores are available on a user’s device, not that Android users are visiting them or making purchases there. Dr. Tucker fails to provide any evidence that these apps stores are constraining the Google Play Store. I discuss the issues with studying the share of Android devices with alternative app stores in detail in Section V.E.2

179. Dr. Tucker also presents Table 6, which shows that “of the top 20 apps by Google Play store U.S. consumer spending on in-app payments and subscriptions in 2021, 80% were also available on the Amazon Appstore.”<sup>428</sup> However, Amazon had an app store penetration rate of just 0.8% in 2021 (which equates to 24 million devices).<sup>429</sup> This compares with Google Play Store’s 100% penetration rate and installation on 2,879 million devices.<sup>430</sup> I would also note that Amazon’s very small pre-installation share is consistent with Google’s exclusionary policies (see further Section V.E.2).<sup>431</sup>

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<sup>425</sup> Tucker Report, ¶¶ 271, 392, and footnote 759. See also, Gentzkow Report, ¶ 188 and footnote 221.

<sup>426</sup> Tucker Report, ¶ 256.

<sup>427</sup> Tucker Report, ¶ 254. Gentzkow Report, ¶ 183. Dr. Tucker’s number is for the U.S. in December 2018. Dr. Gentzkow’s figure is worldwide in 2021.

<sup>428</sup> Tucker Report, ¶ 255 and Table 6.

<sup>429</sup> Rysman Opening Report Exhibit 40.

<sup>430</sup> Rysman Opening Report Exhibit 40.

<sup>431</sup> Dr. Hoffman has claimed that my conclusions regarding limited switching between Apple and Android rely on the Presser Survey.<sup>431</sup> I understand that Dr. Presser will respond to the criticisms of the survey he devised. In any event, my conclusions do not depend on Dr. Presser’s results. As set out in my Opening Report, I rely on numerous surveys and other data sources suggesting that switching costs are high and there is limited switching among mobile OSs. See, Rysman Opening Report, § V.C.4.

**D. Dr. Tucker Calculates Shares in Overly Broad Markets**

180. After concluding that Apple, website digital transactions, web apps, consoles and PC game stores should all be in the relevant market, Dr. Tucker naturally calculates low market shares for Google.<sup>432</sup> However, for the reasons mentioned above in Section III.C, Dr. Tucker's evidence does not suggest these alternatives should be in the relevant market, let alone provide a sufficient constraint on Google's behavior.

181. As an example of Dr. Tucker's flawed market share calculations, she refers to her analysis in Table 5 and suggests that by adding subscription revenue from 13 apps that were not acquired through the Google Play Store or Apple App Store (including Netflix, Spotify, and Zoom, among others), "the Google Play store's share of global consumer spending on digital transactions would fall to 24%."<sup>433</sup> However, she does not explain how, for example, the \$24.8bn spent on Netflix or the \$2.7bn spent on Zoom, constrains Google's behavior in the Android App Distribution Market.<sup>434</sup> Dr. Tucker does the same equivalent calculations for gaming and notes: "[i]f I include the consumer spending on digital transactions through the PlayStation Store, Nintendo Store, and Epic Games Store discussed above, then the Google Play store's share of global consumer spending in gaming transactions would fall to 34%."<sup>435</sup> Again she does not provide sufficient evidence that these alternatives provide a constraint on Google in the Android App Distribution Market (see Section III.C above), and her alternative share calculations should therefore be dismissed.

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<sup>432</sup> Tucker Report, § VIII.H.

<sup>433</sup> Tucker Report, ¶ 523.

<sup>434</sup> Tucker Report, Table 5.

<sup>435</sup> Tucker Report, ¶ 528.



## V. Harm to Competition & Competitive Effects

### A. Overview

182. Dr. Gentzkow presents an analysis of Google’s challenged conduct and responds to certain elements of the analysis presented in my Opening Report. His analysis of Google’s conduct relies on standards that likely find very little conduct anticompetitive. In his analysis of Google’s prices, Dr. Gentzkow asserts that Google’s commission satisfies five factors indicating it is an “effective” price structure.<sup>436</sup> This five-factor test seems manufactured to justify Google’s conduct and. In evaluating Google’s challenged conduct, he considers each element of Google’s challenged conduct separately, separately assessing the anticompetitive and procompetitive effects of each and ignoring the anticompetitive impact of Google’s challenged conduct as a whole.<sup>437</sup> Dr. Gentzkow contends that “availability” of alternative app distribution channels is sufficient to find there is no harm to competition,<sup>438</sup> regardless of the quality or access of these alternatives and despite the fact that Google’s conduct has effectively foreclosed each of these alternatives. He offers explanations for Google’s behavior based on economic efficiency that are speculative and unsupported, and at odds with evidence I present below. And he claims without evidence that users and developers *could* be worse off in the but-for world.<sup>439</sup> Finally, the limited empirical evidence he does present is inconsistent, flawed, and misleading.

183. I have considered Dr. Gentzkow’s own assessment and his criticisms of my analyses, and, as I explain below, I find his assessment and criticisms are largely flawed, misguided, or irrelevant, demonstrated by simple adjustments to his analyses. Therefore, Dr. Gentzkow’s criticisms do not alter my opinion that Google has engaged in conduct that has harmed competition and consumers in the Android App Distribution and Android In-App Billing

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<sup>436</sup> Gentzkow Report, § IV.F.

<sup>437</sup> Gentzkow Report, §§ VII (ACC/AFAs), VIII (MADAs), IX (Early RSAs), X (Later RSAs), XI (Project Hug), XII (Security safeguards), XIII (DDA provision), and XIV (Google Play Billing requirement).

<sup>438</sup> Gentzkow Report, § VI.A.

<sup>439</sup> Gentzkow Report, § XVIII.

Services Markets. I review the most salient issues in Dr. Gentzkow's analyses and criticisms below.

**B. Dr. Gentzkow's Claim that a Large Share of Users and Developers Could Be Worse Off in the But-For World is Speculative and, In Any Event, Not a "Procompetitive" Justification**

184. In the final section of his report, Dr. Gentzkow summarizes his findings by saying that "the evidence taken as a whole suggests that consumers would plausibly be worse off in a but-for world where the challenged conduct was absent."<sup>440</sup> Yet, in the very next sentence he admits that "[p]recisely quantifying welfare in that but-for world is challenging."<sup>441</sup> A but-for world analysis holds all other conduct constant and looks at how things are different in the absence of the challenged conduct. I address the evidence that leads him to the conclusion that a large share of users and developers could be worse off in the but-for world.

185. First, Dr. Gentzkow states "[t]here is no guarantee that any reductions in Google's service fee would be passed on to users. Plaintiffs' experts conclude that this kind of pass-through would likely be large."<sup>442</sup> However, I do not opine on the level of reductions in Google's commission that would be passed on. My model is robust to different pass-through rates and, in fact, the damages number I put forth is for the case of no pass-through. Dr. Gentzkow writes as if the lack of pass-through would mean consumers are not harmed. However, as I show in my Opening Report, if the service fee is not passed on, then developers absorb the effect of high service fees, which forces them out of business and reduces the variety of apps available to consumers.<sup>443</sup>

186. Second, Dr. Gentzkow suggests, without evidence, that "[w]hatever alternatives Google was able to find to address collective action problems on Android would likely be less effective than the current contracts, and the health of the ecosystem could suffer as a result,"

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<sup>440</sup> Gentzkow Report, ¶ 635.

<sup>441</sup> Gentzkow Report, ¶ 636.

<sup>442</sup> Gentzkow Report, ¶ 639.

<sup>443</sup> Rysman Opening Report, ¶¶ 560-563.

including “more fragmentation across devices, lower quality apps, and/or more free riding,” which could lead to a “significant deterioration of the platform.”<sup>444</sup> However, as I discussed in Section 0 below, for example, consumers do not value Google controlling app stores entirely, as evidenced by the low market share of the Google Pixel “out-of-the-box experience” smartphone and the lack of discussion of Google’s control in reviews of the Pixel.

187. Third, Dr. Gentzkow claims that “reducing or eliminating Google’s ability to monetize its investments through a service fee paid by profitable app developers would lead it to change its conduct on other dimensions that could hurt users and app developers” and that “[i]n a but-for world where the ability to earn revenue through service fees was reduced or eliminated, Google’s incentives to support the ecosystem would be weakened and users and app developers would likely suffer as a result.”<sup>445</sup> Yet, as discussed below, a change in Google’s commission rate would have a limited impact on its ability to invest in the Android ecosystem because Google Play Store revenues are a small share of Android revenues.

188. Finally, Dr. Gentzkow points to the situation in China and the downfall of Symbian as “a vivid illustration of what a world without Google’s current conduct might look like.”<sup>446</sup> However, as mentioned below, Gentzkow provides no evidence or analysis to suggest that the Android App Distribution Market without Google’s anticompetitive conduct would suffer the same fate.

**C. I Do Not Need to Specify the Precise But-For World Outcomes to Find that the But-For World is More Competitive than the Actual World**

189. Dr. Gentzkow’s interpretation of the standard required in evaluating a world absent anticompetitive conduct imposes a level of precision that is not necessary to demonstrate harm to competition and consumers. He claims:<sup>447</sup>

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<sup>444</sup> Gentzkow Report, ¶ 640.

<sup>445</sup> Gentzkow Report, ¶ 637.

<sup>446</sup> Gentzkow Report, ¶ 641.

<sup>447</sup> Gentzkow Report, ¶ 66 (emphasis added).

To assess the economic effects of allegedly exclusionary conduct, it is necessary to compare outcomes in the actual world to outcomes in a but-for world where the challenged conduct is absent. This requires (i) defining precisely what forms of conduct would be prohibited in the but-for world; (ii) analyzing what forms of permitted conduct the firm in question as well as other market participants would undertake in the but-for world (consistent with their own economic interests); (iii) comparing outcomes such as prices, output, and welfare in the but-for world to those in the actual world.

190. Dr. Gentzkow’s claim that I needed to specify the exact outcomes of the but-for world is wrong as a matter of economics. Regarding his three criteria, I specified (i) and performed (iii) in my Opening Report. His claim that (ii) is required to assess the economic effects of allegedly exclusionary conduct is wrong. Intuitively, an economist that knows the demand curve and price can calculate quantity and consumer surplus without specifying exactly the market shares of each supplier. That is the approach I take in the context of Google’s commission rate and consumer and developer demand.

191. He further opines in the very next paragraph of his report that because “the but-for world where the at-issue conduct is absent is generally not observable . . . outcomes in this world *must be inferred from theory and empirical evidence.*”<sup>448</sup> And he explains that these challenges are “particularly large in the case of network and platform markets, where changes on one side of the market can have large” effects on the other side.<sup>449</sup> Indeed, this statement supports my opinion that the RSA 3.0 agreements can meaningfully foreclose competition from competing app stores. A smaller foreclosed share of the market, which may be insufficient to demonstrate harm to competition in a one-sided market, may be sufficient to forestall competition in two-sided markets because indirect network effects imply that a loss of share on one side results in a corresponding loss of share on the other side, causing a negative feedback loop. Dr. Gentzkow evaluates conduct in isolation and frequently on a single side only, failing to account for the “sometimes counterintuitive spillover effects” between two-sided platforms that he says must be considered in the but-for world.<sup>450</sup>

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<sup>448</sup> Gentzkow Report, ¶ 67 (emphasis added).

<sup>449</sup> Gentzkow Report, ¶ 67.

<sup>450</sup> Gentzkow Report, ¶ 67.

192. Moreover, Dr. Gentzkow does not contest that, without Google's anticompetitive behavior, there would be more competition. He only quibbles that I do not explain exactly *how* there would be more competition. In other words, Dr. Gentzkow does not disprove that, in the but-for world, Google's commission would be lower or the quality of the Play Store would be improved or the variety of apps available in the Android App Distribution Market would be greater. My Opening Report is careful not to take a position on what the competitive but-for market structure would look like. Perhaps there would be multiple app stores specialized in different categories, or several broad app stores covering overlapping sets of apps, or perhaps Google will continue to have high market share but with lower fees and more apps.

193. Thus, as a matter of economics, my Opening Report shows that it is sufficient to identify an upper bound on the competitive commission that would be realized in the but-for world to calculate counterfactual output, prices, number of apps, and consumer damages. It is not necessary to specify what new entrants in app distribution there would be, or what market shares they would realize. It is a strength of my approach that it is robust to different possibilities.<sup>451</sup> Indeed, my approach is conservative in the sense that I ascribe all of the benefits of competition to lower commissions and the resulting effect on the variety of apps. In general, economists believe that competition leads to other benefits, such as enhanced innovation, variety, and specialization. Overall, I do not see the why an economist would need the specificity that Dr. Gentzkow requires.

194. Further, Dr. Gentzkow's claims above consider a but-for world that removes the entirety of one type of Google's contract, for each contract individually. First, as I discuss in Section V.D.1 below, I do not claim that the entirety of Google's contracts are anticompetitive; rather, I call out certain elements of these contracts that collectively, with other conduct such as

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<sup>451</sup> Related to this, Dr. Gentzkow incorrectly describes my model as a monopoly model of app distribution (Gentzkow Report, ¶ 609). To support this, he provides a general reference to my model section even though I never state that it is a monopoly model, nor do I solve the model as one would for a monopolist. In my model, consumers consume apps. App stores provide access to these apps. Whether there are many app stores or a single app store and whether each app store carries all apps or just a subset is unimportant in my model. As a group, app stores provide access to all apps. I do not model the specific decision of which app store a consumer chooses to consume which app from. Rather, I directly model the choice of the consumer of app consumption.

imposing technological hurdles to sideloading, harm competition by foreclosing alternative Android app distribution channels. Thus, a but-for world analysis is not one that considers the absence of each contract separately; instead, it is one in which Google's collective anticompetitive conduct, which is represented in parts of each contract, is absent.

195. Finally, focusing on the proper question of what the but-for world looks like with respect to Google's conduct in the first instance in my but-for world, the conduct listed on pages 92 and 93 of my Opening Report never happens. Where necessary to respond to particular procompetitive justifications, I propose less restrictive alternatives from Google's actual conduct that could have resulted in the same or similar procompetitive benefits. This helps show whether the conduct is necessary to achieve the purported benefit. However, I do not need to specify which combination of these less restrictive alternatives Google, in fact, would have adopted in the but-for world. It is enough to show that the challenged conduct is not necessary to realize the procompetitive benefits, which in turn demonstrates that the anticompetitive effects outweigh the procompetitive benefits.

**D. Dr. Gentzkow's Analysis of Each Type of Google Contracts and Conduct in Isolation is Misleading**

*1. Dr. Gentzkow Ignores the Collective Impact of Google's Conduct*

196. In Section V.A above and in Section IV.C of my Opening Report, I summarized Google's conduct that enabled it to monopolize Android App Distribution and then use its monopoly power to tie the use of Google Play Billing for apps distributed through the Google Play Store. Importantly, I contend only that certain aspects of Google's relevant contracts, and not the entirety of these contracts, in combination with each other and technological hurdles Google has imposed, are anticompetitive and collectively caused harm to competition and consumers. Dr. Gentzkow, nonetheless, considers each Google contract in its entirety and separately from the other contracts/conduct, evaluates my individual contentions regarding each

contract in isolation, and ignores the collective impact of Google’s challenged conduct on competition and consumers.<sup>452</sup>

197. As I explained in my Opening Report, Google’s contracts and conduct work together to create barriers and foreclose competition.<sup>453</sup> Google adapted its behavior throughout the period under study to restrain competition as it perceived it. Thus, by evaluating each contract or conduct in isolation, Dr. Gentzkow fails to see the harm to competition that Google’s conduct as a whole has created.

198. Evaluating the harm as a whole is supported by the literature. For example, Crane (2010) notes that “aggregating a monopolist’s disparate acts in order to determine liability makes perfect sense,” particularly when “the legality of the defendant’s conduct turns on whether it forecloses a significant share of the relevant market.”<sup>454</sup> Crane (2010) then concludes that “there are undoubtedly some cases in which legality should turn on an analysis of the effects of the conduct, *taken as a whole*.”<sup>455</sup>

199. Google, too, evaluated the impact of its agreements as a whole, a fact Dr. Gentzkow ignores. For example, Google’s business documents demonstrate that Google considered the impact of the RSA 3.0 agreements in relation to its other agreements.<sup>456</sup> Similarly, a December 2018 Google presentation notes that developer incentives, carrier/OEM incentives to prioritize Google Play, and technological changes (“[c]hanges to ‘Unknown Sources’”) are

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<sup>452</sup> In Sections VII to X of his expert report, Dr. Gentzkow separately evaluates Google’s ACC/AFA agreements, MADA, early RSAs, and later RSAs, respectively. In Section XI, Dr. Gentzkow separately evaluates Google’s special developer agreements under Project Hug, and, in Section XII, he separately evaluates Google’s technological hurdles.

<sup>453</sup> Rysman Opening Report, ¶ 363.

<sup>454</sup> Crane, Daniel A., “Does Monopoly Broth Make Bad Soup?” *Antitrust Law Journal*, vol. 76, no. 3, 2010, 663-676, at p. 670.

<sup>455</sup> Crane, Daniel A., “Does Monopoly Broth Make Bad Soup?” *Antitrust Law Journal*, vol. 76, no. 3, 2010, pp. 663-676, at pp. 674-675 (emphasis added).

<sup>456</sup> See Google, “Let’s talk about our business model...,” GOOG-PLAY-000443763.R-798.R, at 766.R-769.R774.R. See also Google, “Game Developer Service Packs,” December 2018, GOOG-PLAY-004708826-851.R, at 832.



different “[l]evers to [a]ccomplish [g]oals.”<sup>457</sup> A March 2019 document describing Google’s planning for RSA 3.0 notes that the rationale of the agreements related to the Play Store included

[REDACTED].<sup>458</sup> A March 2019 Google document, which states that [REDACTED]  
[REDACTED]  
[REDACTED]” identifies Google’s various “projects” targeting developers, OEMs, and  
MNOs.<sup>459</sup>

200. I review additional criticisms by Dr. Gentzkow with respect to Google's contracts below.

a) MADA

201. In my Opening Report, I showed how the MADA’s placement requirements and bundling of mandatory GMS apps with Google Play—and, in some cases, exclusivity clauses—disincentivized OEMs from preloading alternative app stores besides Google Play on their devices.<sup>460</sup> In response, Dr. Gentzkow claims to identify a number of errors in my analysis. I address them in turn below. Nothing that Dr. Gentzkow has pointed out changes my opinions or ultimate conclusions.

202. First, Dr. Gentzkow claims I was wrong to say there is “revenue from the MADA license fees.”<sup>461</sup> As was evident, I was referring here to the EMADA and TMADA, versions of the MADA Google adopted following the European Commission’s ruling against Google’s Android business practices. The citation I provided in the paragraph of my Opening Report that Dr. Gentzkow cites is to the U.K. Competition and Markets Authority investigatory report into Google’s mobile business practices. At the page I cite, the UK CMA report discusses “the

<sup>457</sup> Google, “Game Developer Service Packs,” December 2018, GOOG-PLAY-004708826-851.R, at 832.

<sup>458</sup> Google, “BC: GDAF (Google Distribution on Android Framework) – evolution of RSA deals (BC19-019),” May 6, 2019, GOOG-PLAY4-007239946-951, at 947.

<sup>459</sup> Google, “Project Banyan,” March 2019, GOOG-PLAY-000879069-073, at 072. *See also* Google, “Understanding Play’s Key Constituencies and Dynamics,” GOOG-PLAY-000565846-849, at 847–848.

<sup>460</sup> Rysman Opening Report, § VII.A.1.

<sup>461</sup> Gentzkow Report, ¶ 273 (citing Rysman Opening Report ¶ 393).

revenue Google generates from the EMADA License fee” and notes that that amount is “is lower than the cost it incurs through” the RSAs.<sup>462</sup> Elsewhere in his report, Dr. Gentzkow acknowledges that, under the EMADA, “OEMs must pay a licensing fee for Core Applications (Gmail, Maps, YouTube, and Google Play)”<sup>463</sup> and that the TMADA also “charges a per device license fee.”<sup>464</sup> Thus, we agree that, under these MADA versions (*i.e.*, the EMADA and TMADA), Google earns licensing fees. Nonetheless, I never located any anticompetitive effects from EMADA or TMADA licensing fees, so Dr. Gentzkow’s objection is beside the point.

203. Second, Dr. Gentzkow, like Dr. Tucker, claims that the MADA was introduced when Google did not have monopoly power.<sup>465</sup> However, even if Google did not have market power in the relevant markets at the MADA’s inception, Google has market power today and has for many years.

204. Third, Dr. Gentzkow says I am wrong to assert that the MADA “requires Google Play to be preinstalled at least as prominently as any alternative app stores” because the “MADA makes no reference to the placement of alternative app stores.”<sup>466</sup> As I explain in my Opening Report, what the MADA did say beginning with agreements executed in 2013 was that the Play Store icon must be preinstalled on the default home screen, which is the first screen the user sees upon turning on the device, before any swipes.<sup>467</sup> By definition, there is no screen before the first screen; thus, no app could be placed on a screen that comes before where the Play

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<sup>462</sup> Rysman Opening Report, ¶ 393 & n.813 (citing CMA Final Report on Mobile Ecosystems, ¶ 3.154).

<sup>463</sup> Gentzkow Report, ¶ 270.

<sup>464</sup> Gentzkow Report, ¶ 272.

<sup>465</sup> Gentzkow Report, ¶34.

<sup>466</sup> Gentzkow Report, ¶ 273 (citing Rysman Opening Report ¶¶ 408, 414, 417); *see also* Gentzkow Report, ¶ 310 (citing Rysman Opening Report ¶¶ 408, 414).

<sup>467</sup> Rysman Opening Report, Ex. 61.

Store appears.<sup>468</sup> This is how a Google executive has described the practical effect of the MADA’s placement requirement: “We need to have equal or better placement.”<sup>469</sup>

205. Dr. Gentzkow suggests that alternative app stores could be preinstalled on the default home screen “in positions that arguably may be more prominent” than Google Play because the competing app store icon could be installed further to the top or bottom of the screen it is sharing with the Play Store icon.<sup>470</sup> Dr. Gentzkow cites no evidence that being in one place or another on the default home screen makes any meaningful difference. As noted in my Opening Report and as Google’s own documents confirm, “[t]here is no clear indication that the placement of [the Google] search bar and Play icon matters, as long as it[’]s on the homescreen.”<sup>471</sup> Thus, I clarify my prior statements about the MADA, agree with Dr. Gentzkow that the MADA requires installing the Play store icon on the default screen, and demonstrate that these clarifications do not change my opinions.

206. Fourth, Dr. Gentzkow uses the example of Huawei as support for the proposition that there is significant demand for Google apps to come in the form of the MADA bundle. In Dr. Gentzkow’s telling, “Huawei was blocked from installing Google apps on its Android devices in 2019,” but then sales declined after the ban went into effect.<sup>472</sup> However, Dr. Gentzkow did not consider that Google took steps to ensure that GMS apps would not work

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<sup>468</sup> I wish to correct my description of the parity provisions in the MADAs executed between 2017 and 2020. That clause provides that [REDACTED], GOOG-PLAY-000618885-910, at 895. Because I simply grouped this provision together with the more general default home screen placement requirement in analyzing anticompetitive effects, the language does not affect my analysis or change my opinions. I did not, and do not, undertake separately to trace the anticompetitive effects, if any, from the requirement that [REDACTED] during the time these clauses were in effect, as Google Play was never a “flexible” app: it was mandatory if the OEM wished to take a MADA for any other GMS app.

<sup>469</sup> GOOG-PLAY-001442316, email from Alex Medina to Patrick Brady (Sept. 12, 2012) (“I’m replying to HTC to tell them having Play Store inside of a folder does not comply with MADA placement requirements . . . [Brady]: Right—absolutely. We need to have equal or better placement.”).

<sup>470</sup> Gentzkow Report, ¶ 273.

<sup>471</sup> Rysman Opening Report, Ex. 62.

<sup>472</sup> Gentzkow Report, ¶ 277.

on Huawei devices even when sideloaded by Android users. In February 2020, Google blocked GMS apps from working on “uncertified devices,” which Google recognized would “primarily affect users of recently launched Huawei devices.”<sup>473</sup> Google planned to stop these Android users from logging into their Google accounts on certain GMS apps on Huawei devices.<sup>474</sup>

207. Fifth, Dr. Gentzkow claims that the MADA enhances security by giving OEMs an incentive to install system updates.<sup>475</sup> However, Dr. Gentzkow identifies no such benefit before February 2018.<sup>476</sup> And he does not explain how the requirements that Play be pre-installed on the default home screen or that an OEM must pre-install Play if it wishes to install any other GMS app have anything to do with security. Those are the requirements that would be absent in the but-for world. My claim is not that the MADA (and its license to GMS) generally would cease to exist.

208. Dr. Gentzkow concludes the MADA does not substantially harm competition.<sup>477</sup> However, he did not address specific examples of competing app stores that testified that the MADA harmed their ability to compete with Google: SlideME<sup>478</sup> and GetJar,<sup>479</sup> addressed in my

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<sup>473</sup> Email from Paul Bankhead (Google) to Paul Gennai (Google), “Subject: pr perspective on L3,” February 13, 2020, GOOG-PLAY-004537618-621, at 620.

<sup>474</sup> Miyake (Google) Deposition, pp. 107 (“Q. Okay. Do you recall a plan by Google to block GMS core and Google services from working on uncertified devices? A. Yes. Q. What did that plan involve? A. I can’t recall the specifics . . . it will involve users not being able to sign in to the Google account on some of these apps if the devices are uncertified.”); *see also* Google, “(Comms doc) Improving ecosystem health: Educating users on Android certification,” July 13, 2017, GOOG-PLAY-011461351-353, at 351 (“Following this launch, we will start blocking registration of a Google account (during setup wizard or other entry points within the device like Settings -> Add Account) of newly produced uncertified devices (internally called Level 3 or L3).”).

<sup>475</sup> Gentzkow Report, ¶¶ 287-288.

<sup>476</sup> Gentzkow Report ¶ 287.

<sup>477</sup> Gentzkow Report, § VIII.C.

<sup>478</sup> Christopolous (SlideME) Deposition, pp. 50-51, 55-57.

<sup>479</sup> GetJar referred to the GMS license as the Anti-Fragmentation Agreement, but I understand the point to be the same, even if the incorrect name for the agreement was given by a third party. *See* Dury (GetJar) Deposition, p. 61 (“Q. Is there anything else Google did that you thought gave the appearance of wanting to dominate distribution and control developer innovation? A. Hmm. At that point in time, I’m not sure if the Google – or Android anti-

Opening Report.<sup>480</sup> For all these reasons, I conclude that elements of the MADA, in combination with the other challenged conduct, created anticompetitive effects that outweigh the procompetitive justifications proffered by Dr. Gentzkow, which are either minimal, provided for by more competitive means, or both.

b) Early RSAs

209. In my Opening Report, I detailed how MNOs entered RSAs with Google in the 2009 through 2014 period that gave them a share of Google Play revenue, disincentivizing them from building or distributing competing Android app stores.<sup>481</sup> I additionally flagged ten combined examples of MNOs and OEMs that signed exclusivity clauses for the Android Market/Google Play Store on certain devices, half of which had carve-outs for first-party stores offered by the counterparty.<sup>482</sup> Dr. Gentzkow makes several mistaken claims about this evidence.

210. First, Dr. Gentzkow claims the RSAs were introduced when Google did not have monopoly power.<sup>483</sup> Dr. Gentzkow does not do an analysis to demonstrate that Google did not have market power at the time the RSAs were introduced. Moreover, I have demonstrated Google has significant market power today, both in the U.S. and worldwide (excluding China);<sup>484</sup> thus, whatever justifications there may have been in 2009, there was no procompetitive reason for Google to begin re-introducing Play Store exclusivity clauses in exchange for revenue share in 2019, long after Play had attained scale and dominated virtually every measure of market share in my proposed markets.

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fragmentation agreement was started, but at some point, it was. And that required . . . Android OEMs to include Google Play among other Google apps . . . as a bundle rather than individually, which meant that they couldn't get Google Maps without Google Play. And . . . what that meant was that – in practice, what that meant was, Google Play was on all Android phones. So that wasn't an open choice for OEMs using Android to include different app stores.”).

<sup>480</sup> Rysman Opening Report, ¶¶ 383 & 432, and footnote 893.

<sup>481</sup> Rysman Opening Report, ¶¶ 369-374.

<sup>482</sup> Rysman Opening Report, ¶ 374.

<sup>483</sup> Gentzkow Report, ¶ 36.

<sup>484</sup> Rysman Opening Report, § VI.

211. Second, Dr. Gentzkow claims that I inaccurately stated the agreements that had exclusivity clauses were in effect by 2014. Specifically, he says that “by 2014, the MADAs and RSAs referenced by Dr. Rysman for all but Rogers, Sony, and ASUS had expired (in some instances several years earlier) and generally had been replaced with agreements that did not contain any provisions related to the preinstallation of alternative app stores.”<sup>485</sup> Dr. Gentzkow is mischaracterizing my statement that “[b]y 2014, Google had agreements that forbade the preloading of competitor app stores,” with specifics described in footnotes to my Opening Report.<sup>486</sup> I did not claim that the agreements were still in force in 2014; rather, it was the case that, by 2014, Google *had entered* agreements with the OEMs I listed, though some had expired at that point.

212. Third, Dr. Gentzkow claims these agreements gave carriers an incentive to help jumpstart the Android platform.<sup>487</sup> However, Google was not providing discounts/revenue share for distributing the Android OS; rather, the revenue share payments were about Google’s app store. He incorrectly assumes carriers would not have incentive to support Android OS without payments related to the app store, but carriers had incentive to attract users to their networks and provided phone deals to do so.<sup>488</sup>

213. Finally, Dr. Gentzkow claims worldwide foreclosure was not substantial under the early RSA agreements, noting T-Mobile in the U.S. was the only MNO he was aware of that had an RSA containing provisions [REDACTED], on its devices branded “With Google.” He notes that T-Mobile’s share of wireless subscriptions in the U.S. in

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<sup>485</sup> Gentzkow Report, ¶ 321; *see also id.* ¶ 317.

<sup>486</sup> Rysman Opening Report, ¶ 374.

<sup>487</sup> Gentzkow Report, ¶ 322.

<sup>488</sup> Apple, “Apple Chooses Cingular as Exclusive US Carrier for Its Revolutionary iPhone,” January 9, 2007 <https://www.apple.com/newsroom/2007/01/09Apple-Chooses-Cingular-as-Exclusive-US-Carrier-for-Its-Revolutionary-iPhone/>; Repko, Melissa, “Apple Chooses Cingular as Exclusive US Carrier for Its Revolutionary iPhone,” The Dallas Morning News, September 12, 2017.

2011 was █%, which could include phones not branded as “With Google,” concluding the terms in T-Mobile’s agreement affected only a small share of U.S. devices.”<sup>489</sup>

214. He also makes similar claims about foreign wireless carriers, noting that “LG U+ had 20 percent of the South Korean market in 2014, Deutsche Telekom had approximately 33 percent of the German market in 2013,...Rogers had 34 percent of the Canadian market in 2013/2014 [and] America Movil, which operates in Latin America under different subsidiaries, had 2012 market shares under 50 percent in five of the seven countries in which it operated.”<sup>490</sup> Dr. Gentzkow’s claim that these shares show “the early RSAs did not prevent the development of alternative app stores in the years after Android was introduced.”<sup>491</sup>

215. Dr. Gentzkow’s share calculations consider different geographies separately, though the market is worldwide (excluding China), and some shares he cites are not insubstantial, noting shares from 33 to 50%. The source for his shares of MNOs outside the U.S. shows certain regions with shares in excess of 60%.<sup>492</sup> Yet, he does not provide a share calculation that would consider the impact of all the MNO agreements collectively. Moreover, he also does not consider the impact of similar agreements with OEMs during that time. The question—which Dr. Gentzkow’s analysis does not answer—is whether these early RSAs with both OEMs and MNOs prevented the development of alternative app stores.

#### c) Later RSAs

216. Dr. Gentzkow provides several criticisms of my analysis of Google’s later RSA agreements.

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<sup>489</sup> Gentzkow Report, ¶ 347.

<sup>490</sup> Gentzkow Report, ¶ 348.

<sup>491</sup> Gentzkow Report, ¶ 349.

<sup>492</sup> GSM Association, “Mobile Telephony and Taxation in Latin America,” December 2012, available at [https://www.gsma.com/latinamerica/wp-content/uploads/2012/12/Mobile-telephony-and-taxation\\_WEB\\_compressed.pdf](https://www.gsma.com/latinamerica/wp-content/uploads/2012/12/Mobile-telephony-and-taxation_WEB_compressed.pdf).



217. He claims I mischaracterize the Google Play screen placement requirement in RSA 3.0 agreements.<sup>493</sup> He states I claim that “since 2018 ... Google’s RSAs require OEMs to [set] the Google Play Store ... [in] ‘as good or better placement than competing app store[s]’” and then contends the source presentation relates to RSAs with MNOs, not OEMs.<sup>494</sup> He goes on to state that “Google’s RSA 3.0s with OEMs specify that Google Play be placed on the default home screen (echoing the MADA), but not that it receive as good or better placement than competing app stores.”<sup>495</sup>

218. I have several issues with Dr. Gentzkow’s characterization of my claim. First, he misinterprets my statements. I wrote:<sup>496</sup>

387. In addition to the more general RSAs Google executed, since 2018 Google has included exclusivity clauses more broadly in its RSAs with OEMs.<sup>497</sup> Google’s RSAs require OEMs to meet certain criteria setting the Google Play Store “preloaded and on the home screen with as good as or better placement than competing app store[s].”<sup>498</sup>

388. Starting in 2019, Google developed RSA 3.0 agreements with OEMs that included restrictions on what can be installed on devices. For example, Google required OEMs to place the Google Play Store as the “only application store on Default Home Screen” and set as the “default marketplace for applications, games, books, movies, music, and all other digital content (including subscriptions).”<sup>499</sup> In order to qualify for certain revenue share tiers, OEMs have to agree not to preload competitive apps in addition to Google apps.<sup>500</sup>

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<sup>493</sup> Gentzkow Report, ¶ 375 (citing Rysman Opening Report, ¶ 387), stating “neither Dr. Rysman nor any other Plaintiffs’ expert has identified RSA 3.0s with MNOs that contain such terms.”

<sup>494</sup> Gentzkow Report, ¶ 375.

<sup>495</sup> Gentzkow Report, ¶ 375.

<sup>496</sup> Rysman Opening Report, ¶¶ 387-388 (internal footnotes and paragraph references in original).

<sup>497</sup> Google, “Let’s talk about business model,” GOOG-PLAY-000443763.R-798.R, at 775.R.

<sup>498</sup> Google, “Android Partnerships Strategy Rethink,” May 6, 2015, GOOG-PLAY-001184813-857, at 823.

<sup>499</sup> Google and OnePlus, “Google Mobile Revenue Share Agreements,” February 1, 2020, GOOG-PLAY-000416651-697, at 679.

<sup>500</sup> Kolotouros (Google) Deposition, p. 115 (“Q. In at least some of the tiers of the RSAs, there are such restrictions in connection with the devices on those tiers, correct? A. To the extent the OEM is elected to enroll the device in that tier, yes. Q. And if they elect into those tiers, they get more money in terms of revenue share than the lower tier, the base tier that you were just describing, right? A. That is correct, yes”).

While there is a misplaced paragraph break at the end of paragraph 387, a continuous read of those two paragraphs makes clear that my intention was to note that earlier RSA agreements require “as good or better placement” while the RSA 3.0 agreements use the “Default Home Screen” language.

219. Dr. Gentzkow also claims I mischaracterize “the share of devices affected by the Premier Tier terms”<sup>501</sup> and contends the Google source documents I cited in support for my assumptions are also mischaracterized.<sup>502</sup>

220. First, my Opening Report used Google projection documents to generate the assumption that Google was aiming to increase premier tier device coverage in the RSA 3.0 to 100% of devices if it could.<sup>503</sup> I demonstrated that if those assumptions hold, more than 40% of new Android smartphone sales worldwide and in the United States would contain an exclusivity clause in exchange for revenue share from the Google Play store.<sup>504</sup> As I explained in my Opening Report, Google documents clearly portray Google’s intent “to increase the proportion of Android smart mobile devices covered by RSAs . . . to 100%.”<sup>505</sup> While Play exclusivity under the RSA 3.0 agreements pertains specifically to Premier Tier devices as defined in the agreement, Google must first sign up OEMs to RSA 3.0 agreements before it can work to expand OEMs’ coverage of Premier Tier devices. Thus, Google’s intention to expand devices covered by RSA 3.0 agreements to 100% is relevant.

221. I modeled foreclosure in this way because, at the time I filed my Opening Report, Google had not produced full RSA 3.0 data showing which devices were in the Premier Tier. That data would have allowed me to determine the share of new devices sold that were subject to an exclusivity clause. Days after my report was served, Google produced that data for the first

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<sup>501</sup> Gentzkow Report, ¶ 418.

<sup>502</sup> Gentzkow Report, ¶¶ 38, 418.

<sup>503</sup> Rysman Opening Report, ¶ 394.

<sup>504</sup> Rysman Opening Report, ¶¶ 397-98 & Exs. 58 & 59.

<sup>505</sup> Rysman Opening Report, ¶ 394 (citing to Google, “BC: GDAF (Google Distribution on Android Framework) – evolution of RSA deals (BC19-019),” May 6, 2019, GOOG-PLAY4-007239946-951, at 949.).

time. On review of that new data, I am able to correct Dr. Gentzkow's calculations of the share of Android smart mobile devices that the RSA 3.0 forecloses alternative stores from preloading, which are the devices activated after the implementation of the RSA 3.0.

222. Second, I did not mischaracterize what Google projected in its own documents. Dr. Gentzkow points out that I had written that “Google estimated that in 2019 around █% of new Android activations were governed by an RSA 3.0” and faults me because the Google document I cite in support of that claim (Exhibit 55 to my Opening Report) “includes charts from the first quarter of 2019, *before* the Premier Tier terms were even introduced.”<sup>506</sup> Of course this is correct – I should have said more precisely that Google *estimated* in 2019 that █% of new Android activations *would be* governed by an RSA 3.0. But despite this quibble, the underlying point remains: Google intended RSA 3.0 to broadly prevent the pre-installation of third-party app stores. Ultimately, Samsung did not execute an RSA 3.0 contract; Google also attempted a strategy of paying Samsung to abandon its own proprietary store; and Samsung today nevertheless does not pre-install competing third-party app stores.<sup>507</sup> In any event, now that I have actual data, (which had not been produced when I was preparing my Opening Report), Google's projections are less important for calculating actual foreclosure.

223. While the Premier Tier was only recently launched, Google documents that Dr. Gentzkow overlooks show that Premier Tier device activations are increasing and expected to continue increasing. For example, Google documents, which he claims “confirm the share of device activations covered by the Premier Tier terms in RSA 3.0s is small,”<sup>508</sup> in fact show that the share of premier tier device activations is increasing and emphasize that RSA3 is growing much faster than RSA2 during the same “ramp up period.”<sup>509</sup> In certain countries, Google notes that Premier Tier activations are “reaching [a] critical mass of Premier Tier where Premier Tier

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<sup>506</sup> Gentzkow Report, ¶418; Google, “Android Commercial Agreements,” October 2020, GOOG-PLAY-011057832-886, at 845.

<sup>507</sup> Rysman Opening Report, ¶ 407.

<sup>508</sup> Gentzkow Report, ¶ 400.

<sup>509</sup> Google, “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R-577.R, at 559.R.

device activations exceeded activations of non-Premier open market devices.”<sup>510</sup> A February 2021 document notes that almost █ out of every █ devices sold was a Premier device in January 2021 and that they are expected to increase.<sup>511</sup> Further, Google notes that certain OEMs for which Premier Tier penetration is lower are ramping up their devices.<sup>512</sup>

224. Dr. Gentzkow criticizes other Google documents I cite that similarly identify Google’s forecasts with respect to expanding its RSA 3.0 agreements. For example, he states I claim that “the share of devices sold under RSA 3.0 Premier Tier is █% in Great Britain and at least █% in France, Germany, and Brazil, with the share of devices sold under all RSA versions reaching between █% to █% in these countries” and points out that Samsung and Huawei are excluded.<sup>513</sup> First, the source document clearly supports each of these figures.<sup>514</sup> Second, this document highlights that even Google believes that Samsung should not be included in shares related to RSA 3.0 agreements by excluding them from their forecasts and calculations. Finally, the prior page of this document, depicted in Exhibit 10 below, demonstrates the tremendous growth in Premier Tier activations, stating that “Premier Tier devices [are] globally increasing █% [month over month]” and depicts Premier Tier activations for a number of top OEMs, which shows that together they attained █% of Google’s device activation target and rapid growth in device activations.

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<sup>510</sup> Google, “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R-577.R, at 563.R.

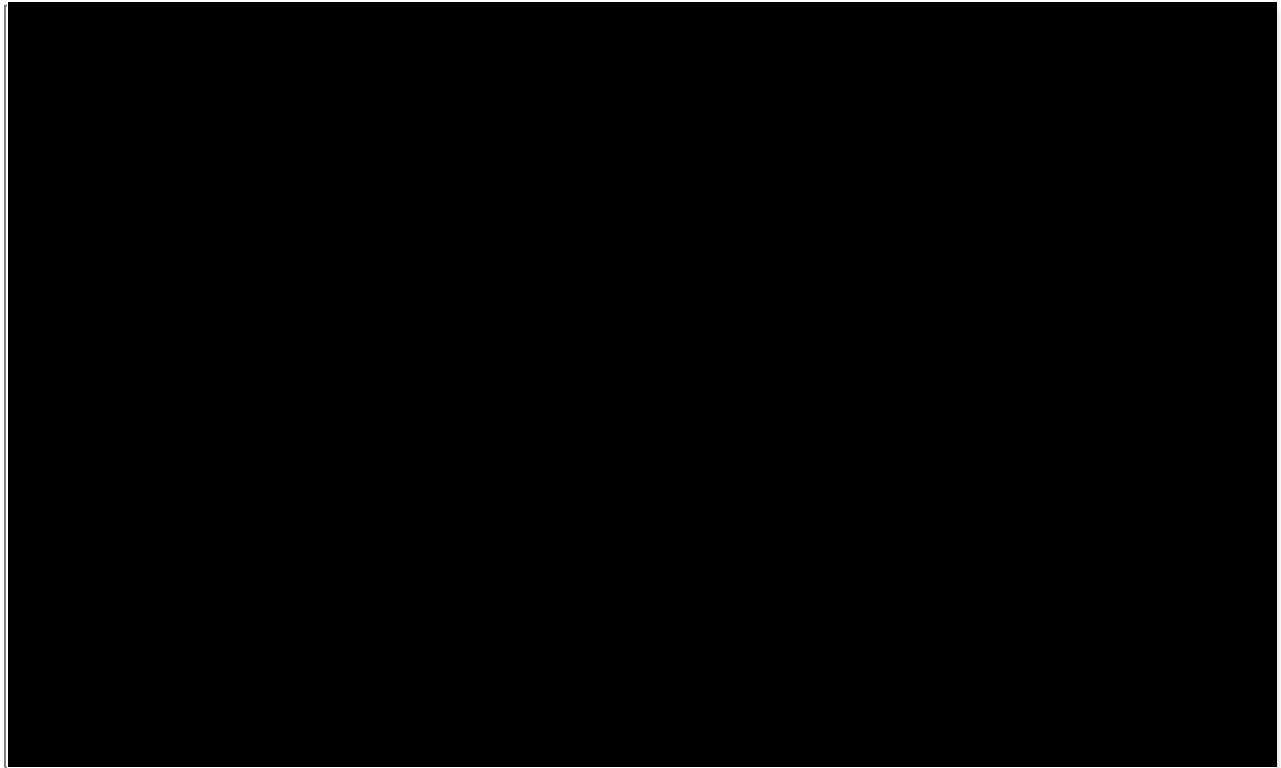
<sup>511</sup> Google, “P&E Partnerships Ops Meeting Bi-Weekly,” February 24, 2021, GOOG-PLAY-003894142-177, at 172.

<sup>512</sup> Google, “P&E Partnerships Ops Meeting Bi-Weekly,” February 24, 2021, GOOG-PLAY-003894142-177, at 176.

<sup>513</sup> Gentzkow Report, ¶ 418, citing Rysman Opening Report, ¶ 394 (Google, “P&E Partnerships Ops Meeting Bi-weekly,” February 24, 2021, GOOG-PLAY-003894142.R-177.R. at 176.R.).

<sup>514</sup> Google, “P&E Partnerships Ops Meeting Bi-weekly,” February 24, 2021, GOOG-PLAY-003894142.R-177.R. at 176.R.

**Exhibit 10**  
**Rapid Growth in Premier Tier Devices**



*Source:* Google, “[REDACTED],” February 24, 2021, GOOG-PLAY-003894142.R-177.R., at 175.R.

225. Finally, Dr. Gentzkow’s claim that RSA 3.0 agreements reduce bloatware, thereby enhancing the value of the Android ecosystem, once again considers only one piece of Google’s conduct in isolation and ignores the collective impact of Google’s contracts.<sup>515</sup> Dr. Gentzkow ignores evidence that Google’s MADA, which OEMs must sign to access the Google Android OS and its GMS suite of apps, increases bloatware by requiring OEMs to install

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<sup>515</sup> Gentzkow Report, ¶ 37, § X.B.

Google's GMS suite of apps.<sup>516</sup> Dr. Gentzkow provides no evidence identifying whether and how collectively the agreements resolve bloatware.

2. *Dr. Gentzkow's Premier Tier Analysis Understates the Impact of Google's RSA 3.0 Agreements*

226. Dr. Gentzkow contends "the later RSAs have not substantially harmed competition" but instead "are likely to increase rather than decrease competition."<sup>517</sup> As evidence, he claims "[s]ince December 2019, Premier Tier provisions have never affected more than a small share of Android devices," contending that "Premier Tier provisions applied to only █ percent of all active GMS devices worldwide (excluding China)...and only █ percent of all active GMS devices in the United States" and "even smaller if we focus on the higher-quality devices that are most relevant to game developers."<sup>518</sup> However, there are several issues with this claim. First, there is no reason to focus only on higher-quality devices because Google documents demonstrate its goal to expand the reach of its Premier Tier terms, noting that "OEMs have been launching a majority of RSA devices on the premier tier," and its expectation that "█

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<sup>516</sup> Rysman Opening Report, ¶ 367. Professor Bernheim points out in his opening report that Motorola requested that the MADA include "█". They wanted █ because its "█" and Motorola "█". See Bernheim Opening Report, ¶ 271; E-mail from Bjorn Kilburn to Jim Kolotouros, Vice President of Android Platform Partnerships at Google, "Subject: Re: Hangouts," October 3, 2015, GOOG-PLAY-001925008-010, at -5008-5009. In response, Jim Kolotouros, Google's Vice President of Android Platform Partnerships, stated that Google █ and that Kilburn would have to █. See Kolotouros (Google) Deposition, p. 159 ("Q: And you said that if that was going to be a problem, they would have to █. A: That is correct. Q: YY is the – a reference to the CEO of Lenovo? A: That is correct."); E-mail from Jim Kolotouros to Bjorn Kilburn, "Subject: Re: Hangouts," October 3, 2015, GOOG-PLAY-001925008-5010 at -5008. Ultimately, Google rejected Motorola's request to █. See Kolotouros (Google) Deposition, p. 151 ("Q: Motorola asked Google to █. A: I believe that was what Bjorn had requested. Q: And Google █, correct? A: That is correct.").

<sup>517</sup> Gentzkow Report, ¶¶ 394-395.

<sup>518</sup> Gentzkow Report, ¶¶ 396-397, 408 and Exhibit 33.

devices will be covered by an [OEM] rev share agreement...by 2023 and that enrollment of devices will generally be between ██████%.”<sup>519</sup>

227. Second, Dr. Gentzkow’s ██████% figure is not an appropriate measure to reflect foreclosure of rival app stores on Android devices because it is based on the *stock* of total Android devices, which includes the stock of devices sold long before Google entered into RSA 3.0 contracts with OEMs. Google began entering into RSA 3.0 contracts with OEMs in December 2019,<sup>520</sup> and I understand most major OEMs were under contract by May 2020.<sup>521</sup> To evaluate the impact of the Play exclusivity provision of Google’s RSA 3.0 contracts in terms of its ability to foreclose rival app stores from being pre-installed on Android devices, only phone *sales* subsequent to the implementation of the RSA 3.0 contracts should be considered. Using data on device activations produced by Google *after* I filed my Opening Report,<sup>522</sup> Dr. Gentzkow recognizes that, according to “the flow of new device activations governed by [Premier Tier] terms,” for the period December 2019 through August 2022, ██████% of all device activations worldwide (excluding China), and ██████% in the United States, were Premier Tier.<sup>523</sup>

228. Dr. Gentzkow’s claim that ██████% of all device activations worldwide (excluding China), and ██████% in the United States, were Premier Tier during the period December 2019 through August 2022, and his consequent conclusion that the share of device activation covered by Premier Tier terms is small, also elides the fact that Google’s data and documents

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<sup>519</sup> Rysman Opening Report, ¶¶ 394-395 (citing Google, “BC: GDAF (Google Distribution on Android Framework) – evolution of RSA deals (BC19-019),” May 6, 2019, GOOG-PLAY4-007239946-951, at 949; and “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R, at 560.R. *See also* Google, “OEM RSA3 Program Review,” October 2020, GOOG-PLAY-006861555.R-577.R, at 568.R) and Exhibit 56. *See also* Google, “PEX & BC review: Google Distribution on Android Framework,” June 2019, GOOG-PLAY-004488106.R-164.R, at 121.R.

<sup>520</sup> Gentzkow Report, ¶¶ 38, 369, 396.

<sup>521</sup> Rysman Opening Report, Ex. 58-59; Email from Christopher Li (Google) to Don Harrison (Google), GOOG-PLAY-009436873 (May 28, 2020) (announcing “the counter-signature of revenue share agreements with most of our major Android OEM partners, including Xiaomi, Vivo, Oppo, OnePlus, Sony, Sharp, LG, Moto/Lenovo, HMD, and TCL (we still have one large one left to go – but that one will take a bit longer ;).”).

<sup>522</sup> Google, “RSA Activations Data, Worldwide Excluding China,” GOOG-PLAY-011657415; GOOG-PLAY-011657416; GOOG-PLAY-011657417; GOOG-PLAY-011657418; GOOG-PLAY-011657419; GOOG-PLAY-011657420; GOOG-PLAY-011657421; GOOG-PLAY-011657422; GOOG-PLAY-011657423; GOOG-PLAY-011657424; GOOG-PLAY-011657425.

<sup>523</sup> Gentzkow Report, ¶ 400 and Exhibit 34.



demonstrate the share of Premier Tier device activations has been growing and that growth is expected to continue as noted above.<sup>524</sup>

229. Additionally, Dr. Gentzkow includes in his calculations devices that were not contestable, and, thus, his analysis does not reflect the overall impact to non-OEM third-party app stores, such as F-Droid and Aptoide. For example, he includes Google's devices, even though Google has no incentive to pre-load a rival Android app store. Moreover, Samsung pre-installs the Galaxy Store and, thus, also has no incentive to install additional third-party app stores. Google documents demonstrate that Google excludes Samsung when evaluating the impact of its RSA 3.0 contracts and Premier Tier provision.<sup>525</sup>

230. Accounting for these corrections, I have recalculated the Premier Tier shares shown in Dr. Gentzkow's Exhibit 34. As depicted in Exhibit 11 below, using the data relied on by Dr. Gentzkow, I find the share of Premier Tier device activations worldwide (excluding China) has grown to approximately █% since April 2020 and over █% excluding Google and Samsung.<sup>526</sup> Excluding Google and Samsung from the Premier Tier share of device activations shows that the share of Premier Tier devices has been growing faster for other OEMs.

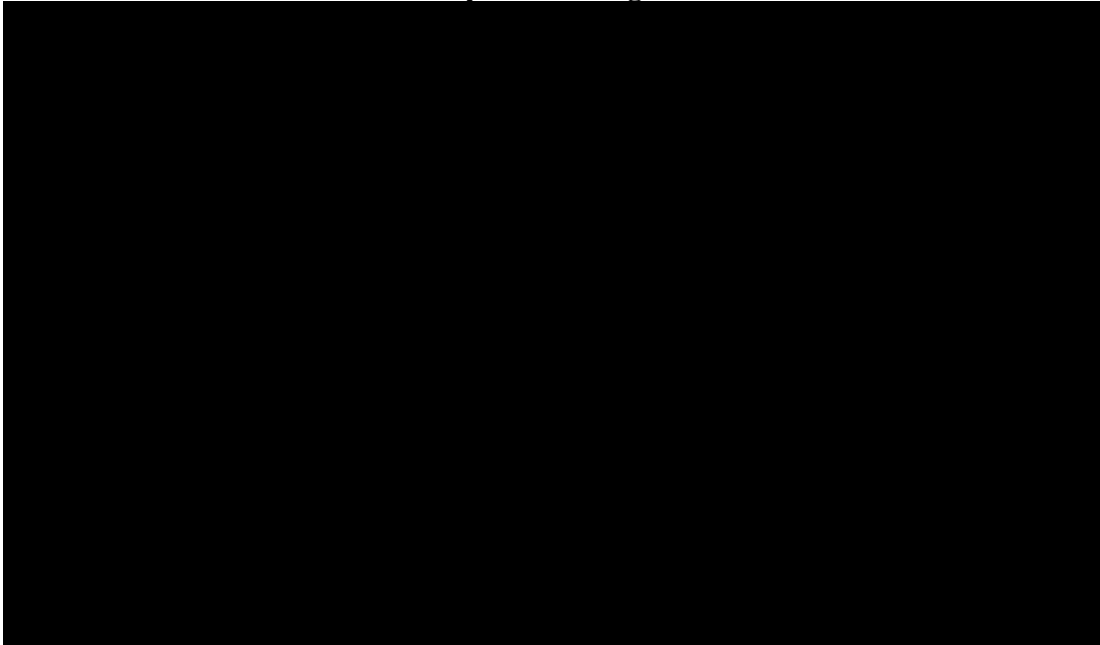
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<sup>524</sup> In my Opening Report, I presented evidence from Google documents demonstrating that devices covered by Premier Tier terms has been growing. *See* Rysman Opening Report, § VII.A.1.a.

<sup>525</sup> *See, e.g.*, GOOG-PLAY-004488106.R, at 107, 109.

<sup>526</sup> The share of Premier Tier device activations in only the United States was approximately █% in August 2022 and █% excluding Google and Samsung. *See* Rysman Rebuttal Report Workpapers.

**Exhibit 11**  
**Worldwide (excluding China) Share of Premier Tier Device Activations**  
**(excluding Google and Samsung)**  
**January 2020 – August 2022**



*Source:* Gentzkow Backup Production.

231. These shares are quite similar to the estimated foreclosure share of 45% in 2021 depicted in my Opening Report.<sup>527</sup> Additionally, Google forecasts that OEMs won't be fully contracted in RSA 3.0 agreements in which it expects ■%-■% of devices to be enrolled until 2023, thereby indicating these estimates are an underestimate of the expected foreclosure if Google's challenged conduct continues.<sup>528</sup>

232. Finally, even if the share of RSA 3.0 devices is relatively small, the RSA 3.0's impact could nonetheless be significant. Dr. Gentzkow's analysis ignores that, as I explained in my Opening Report, in a two-sided market, "the effect of...reduced competition can be magnified due to indirect network effects" because "if a rival app store cannot reach a share of

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<sup>527</sup> Rysman Opening Report, ¶ 398 and Exhibit 58.

<sup>528</sup> Google, "PEX & BC review: Google Distribution on Android Framework," June 2019, GOOG-PLAY-004488106.R-164.R, at 121.R

consumers, then fewer consumers would attract fewer developers, and then fewer developers would attract fewer consumers, etc.”<sup>529</sup>

### 3. *Dr. Gentzkow Overlooks Important Elements of Project Hug*

[illegible]

234. Dr. Gentzkow also claims that “Project Hug represents straightforward competition on the merits,” offering certain app developers “a better deal via enhanced service and discounts in exchange for their choosing to distribute their apps through Google Play and to co-invest in the Android ecosystem.”<sup>533</sup> But Dr. Gentzkow fails to acknowledge that a firm’s ability to engage in price discrimination requires market power. The fact that Google cut prices

<sup>529</sup> Rysman Opening Report, ¶ 365,

<sup>530</sup> Gentzkow Report, ¶ 427.

<sup>531</sup> Gentzkow Report, § XI.A, ¶ 427.

<sup>332</sup> Email from Lawrence Koh, Former Director and Global Head of Games Business Development at Google, to Google Personnel, “Subject: Fwd: [Privileged & Confidential] Riot – Update,” February 13, 2020, GOOG-PLAY-007035840-843, at 840.

<sup>533</sup> Gentskow Report, ¶ 39; see also ¶ 428, § XI.B (Project Hug “is a straightforward example of competing for business by offering consumers (in this case game app developers) a better deal,” which enhances the value of the Android ecosystem).

and offered an enhanced service through Project Hug is not evidence that trade took place at competitive terms. What he calls competition on the merits fits the standard description of exclusive dealing. Foreclosure through exclusive dealing is not defined by buyers getting nothing in return from a seller; it is when a large seller signs exclusive deals with buyers preventing them from creating market share for a rival.<sup>534</sup>

235. Dr Gentzkow also claims that there is no harm to competition from Project Hug because the terms of Project Hug agreements do not constrain the ability of the developers to list their apps in competing app stores in addition to listing them on Google Play.<sup>535</sup> But a key way for alternative app stores to compete with the Google Play Store, especially given its dominance, is to offer something unique to users. Google's simultaneous requirement forces developers to publish apps with the same content on the Google Play Store simultaneously with their launch on alternative app stores, thereby preventing alternative app stores from offering unique or exclusive content, unless they want to forgo listing on the Play Store, which most developers would not want to do given the Play Store's dominance and number of users.<sup>536</sup> Thus, Project Hug limits competition from alternative app stores.

#### **E. Dr. Gentzkow Fails to Show that Competition Was Not Foreclosed**

##### *1. Dr. Gentzkow's Claim that App Developers Reach Users through Many Channels Focuses on "Availability"*

236. Dr. Gentzkow claims that "[c]ompetition for transactions between users and app developers has not been foreclosed. App developers can and do reach users on Android via app stores other than Google Play, direct downloads, preinstallation by OEMs and MNOs, cloud gaming, web apps, and non-Android platforms including iOS, PCs, and gaming consoles."<sup>537</sup> Essentially Dr. Gentzkow's claim is that having access to alternative app distribution methods

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<sup>534</sup> Asker, John, "Diagnosing Foreclosure Due to Exclusive Dealing," The Journal of Industrial Economics, Vol. 64, No. 3, pp. 375-410, at 375.

<sup>535</sup> Gentzkow Report, ¶ 40.

<sup>536</sup> Gentzkow Report, ¶ 422 (citing to Koh (Google) Deposition).

<sup>537</sup> Gentzkow Report, ¶ 29.

suggests anticompetitive foreclosure has not occurred. However, Dr. Gentzkow's focus on channel access (or availability) is not grounded in antitrust principles. For example, Salop (2017), notes that foreclosure "generally describes exclusionary conduct that totally or partially 'forecloses' competitors from access either to critical inputs or customers, with the effect of causing them to raise their prices or reduce their output," and that crucially, foreclosure "does not require the exit of rivals, or even the permanent reduction in competitors' production capacity."<sup>538</sup> Therefore, it is not only access or availability that is important, but also whether rival app stores were disadvantaged in their ability to compete with the Google Play Store. how much Android users are using each channel must be analyzed in order to understand the degree of competition that remains.

237. I cover Dr. Gentzkow's claims of access through many different channels in more detail below.

## 2. *Dr. Gentzkow Provides Limited Examples of Pre-Installation*

238. Dr. Gentzkow claims that alternative apps stores "can be preinstalled by OEMs and MNOs and can also be downloaded directly by users."<sup>539</sup> He notes "[t]here are at least several dozen alternative app stores currently available for download to Android devices" including "Samsung Galaxy Store, the Amazon Appstore, Aptoide, ONE Store, and the Vivo AppStore," and that "alternative app stores are currently preinstalled on the *majority* of Android devices, and a substantial share of users take advantage of them to download apps."<sup>540</sup>

239. In support of this claim, Dr. Gentzkow presents Exhibit 14, which shows the "Share of Android Devices with at Least One App Store in Addition to Google Play" has grown to █████% by July 2021.<sup>541</sup> Additional data he cites shows that this is mainly due to the Samsung

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<sup>538</sup> Steven Salop, "The Raising Rivals' Cost Foreclosure Paradigm, Conditional Pricing Practices, and the Flawed Incremental Price-Cost Test," 81(2) ANTITRUST LAW JOURNAL 371, pp. 376-377 (2017)

<sup>539</sup> Gentzkow Report, ¶ 181.

<sup>540</sup> Gentzkow Report, ¶ 183 (emphasis in original).

<sup>541</sup> Gentzkow Report, Exhibit 14.

Galaxy Store, which is installed on [REDACTED] % of GMS devices worldwide (excluding China). Dr. Gentzkow neglected to highlight the equivalent figures for Amazon App Store ([REDACTED] %) and LG Smart World ([REDACTED] %).<sup>542</sup> Importantly, this evidence just shows whether a store is available or installed on an Android device. It does not show whether Android users are *using* these pre-installed app stores to download apps, nor does it show other important dimension of competition such as whether these app stores have a similar selection of apps (in terms of both quantity and quality).<sup>543</sup>

240. In my Opening Report, I presented multiple metrics showing users in fact do not use alternative apps stores on the Android devices, despite high rates of pre-installation (which Dr. Gentzkow does not dispute).<sup>544</sup> For example:

- Samsung's Galaxy store only achieved a modest 5% share of monthly app store visits relative to Play Store, with Xiaomi also on 5%.
- I estimate that Google's share of app downloads is [REDACTED] %, leaving just [REDACTED] % for all other Android App Stores.
- Samsung's "% of total monthly app store visits to the [Galaxy] store" is just 2%, and their "% of total monthly app store time spend on the [Galaxy] store" is also 2%. This compares to Play Store's [REDACTED] % and [REDACTED] % respectively.
- Consumer surveys show that 90% of Android users downloaded apps through Google Play most often, with only 4% using the Samsung Galaxy Store most often.

This is unsurprising given Google substantially disadvantaged other app stores, e.g., through contracts that put alternative app stores at disadvantaged locations on the smartphones and constrained what developers could put on rival app stores (e.g., through sim ship requirement).

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<sup>542</sup> Gentzkow Report, ¶ 184; Rysman Opening Report Exhibit 40.

<sup>543</sup> As presented in Exhibit 45 in my Opening Report, the Google Play Store has many more apps available than alternative apps stores: the Samsung Galaxy Store offered only 150,000-200,000 apps in March 2017, Amazon Appstore offered 700,00-900,000 apps in April 2017, and Aptoide offered 900,000 apps in June 2017.

<sup>544</sup> Rysman Opening Report, ¶¶ 305-306 & 310; and Exhibits 41-42 & 44.

241. Additionally, data from Google presented in Exhibit 12 below demonstrates that monthly active users of Android smart mobile devices that have and use an alternative app store are largely using the app store from the OEM when using an alternative to Google Play. For example, in 2021 █% used the Samsung Galaxy Store (*i.e.*, only █% used a third-party app store); on average, in 2021, █% of mobile device users that used a non-Play app store used the manufacturer's app store (*i.e.*, only █% used a third-party app store). Thus, third-party app stores are not generally gaining access to Android smart mobile devices users or the money they spend on apps. Moreover, the share of Samsung device monthly active users that use a third-party app store (*i.e.*, not the Samsung Galaxy Store) decreased from █% in 2015 to █% in 2021; on average, the share of monthly active users that use a third-party app store decreased from █% in 2015 to █% in 2021.

**Exhibit 12**  
**Share of Non-Play Monthly Active Users not from that Manufacturer**



*Notes:*

*Sources:*

1. GOOG-PLAY-007203253.
2. GOOG-PLAY-010801683.

242. Dr. Gentzkow also notes that “competing app stores can contract with OEMs or MNOs to preinstall their stores and give them prominent placement.”<sup>545</sup> However, his supporting

<sup>545</sup> Gentzkow Report, ¶ 181.



evidence is [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]<sup>548</sup> This evidence suggests that, despite the OEM or MNO contracts, penetration was still a fraction of Google Play Store’s penetration. Additionally, any app store that is preinstalled competes with the OEM app store. Economics would suggest the cost of preinstallation to the rival app store would be higher than what developers would typically pay for preinstallation of apps because a rival app store would cannibalize the OEM’s own app store. Thus, the cost of pre-installation of rival app stores channel may face relatively high costs.

### 3. Dr. Gentzkow’s Statistics on Sideloaded are Misleading or Not Reliable

243. In Exhibit 14 to his report, Dr. Gentzkow presents data on installations of alternative app stores, which he claims shows, “[o]f the worldwide (excluding China) GMS

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<sup>546</sup> Gentzkow Report, footnote 205. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

<sup>547</sup> AMZ-GP\_00005705-728, at 711-712.

<sup>548</sup> Rysman Opening Report, Exhibit 44

devices with Google Play installed as of July 1, 2021, more than ■ percent also have at least one alternative app store installed.”<sup>549</sup> He also notes that “[e]ven if an alternative app store is not preinstalled, users have the option of directly downloading certain app stores themselves.”<sup>550</sup>

244. However, as discussed above, these devices with at least one other app store installed are likely due to pre-installation by an OEM (and particularly the Samsung Galaxy Store’s prominence with ■% share of pre-installed app stores, as noted above) rather than the success of any sideloading of alternative app stores. In addition, Samsung is disincentivized from pre-loading any other Android app stores in order to protect its own share of the market for Android app distribution. Thus, for a large proportion of Android devices (*i.e.*, Samsung devices), pre-installation of a non-Play (and non-Galaxy App Store) is not a viable distribution channel.<sup>551</sup> Also, his evidence of direct downloads of app stores (“3 percent for devices in the United States, but reaches 12 percent in India, and 23 percent in Iran”) also shows a limited number of Android users directly download an alternative app store, let alone use that app store to download apps (see my statistics on app store visits, Android app downloads, consumer expenditure, and user engagement presented in my Opening Report).<sup>552</sup>

245. Additionally, Dr. Gentzkow presents Exhibit 15, which shows that in June 2022, ■% of “GMS devices have at least one app downloaded outside of Google Play,” and that “[i]n June 2022 there were more than ■ devices that had downloaded at least one app through alternative sources.”<sup>553</sup> He then concludes: “[u]se of alternative app stores and direct downloading is not only not foreclosed, it is common.”<sup>554</sup> However, even Dr. Gentzkow admits himself that this data is not a reliable indicator of users actively downloading apps: “[s]ome of these devices may reflect app downloads that were not initiated by the user, including apps that

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<sup>549</sup> Gentzkow Report, ¶ 183.

<sup>550</sup> Gentzkow Report, ¶ 183.

<sup>551</sup> See, Rysman Rebuttal Report Backup Production; IDC, “IDC Quarterly Mobile Phone Tracker, 2021Q4 Historical Release,” February 11, 2022.

<sup>552</sup> Gentzkow Report, footnote 211; Rysman Opening Report, ¶¶ 305-308.

<sup>553</sup> Gentzkow Report, ¶ 185 (emphasis in original).

<sup>554</sup> Gentzkow Report, ¶ 185.

may not be visible to the user and installed on a device through a preinstalled app with APK installer rights (e.g., a preinstalled app store).<sup>555</sup> Furthermore, Dr. Gentzkow does not provide evidence about the nature of these apps, whether and how they monetize, and whether they are comparable to apps in a typical Android app store. His analysis does not show whether users are using this app distribution method in any meaningful way such that sideloading or alternative app stores can compete with Google in the Android App Distribution Market. The data merely shows that the device downloaded “at least one.” As noted in my Opening Report, no alternative Android app store has managed any meaningful share of the Android App Distribution Market, despite the availability of sideloading.<sup>556</sup>

246. Finally, Dr. Gentzkow presents Exhibit 16, which shows “the total number of new apps installed from a preinstalled alternative app store, as well as the total number of new apps installed via a user-installed alternative app store or direct downloading.”<sup>557</sup> By May 2021, he notes that there were [REDACTED] such downloads *per month*” and when including app updates and re-installs, “there were close to [REDACTED] downloads per month in May 2021 from sources other than Google Play.”<sup>558</sup> However, these data show that direct downloading are an unknown portion of less than half of these [REDACTED] downloads.<sup>559</sup> Additionally, Dr. Gentzkow neglects to highlight Google Play’s app installations from the same data source. The [REDACTED] downloads from sources other than Google Play pale in comparison to the roughly [REDACTED] downloads from Google Play.<sup>560</sup> Moreover, assuming the share of direct downloads for the [REDACTED] downloads including auto updates and reinstalls is similar to the share of direct downloads for the [REDACTED] app installs, the total share of direct downloads is less than [REDACTED] out of [REDACTED]; that is, less than [REDACTED]%. Thus, sideloading is not a large share of the Android App Distribution Market.

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<sup>555</sup> Gentzkow Report, footnote 214.

<sup>556</sup> Rysman Opening Report, Exhibits 40, 44 and 45.

<sup>557</sup> Gentzkow Report, ¶ 187.

<sup>558</sup> Gentzkow Report, ¶ 187 (emphasis in original).

<sup>559</sup> Gentzkow Report, Exhibit 16.

<sup>560</sup> “System Installers vs. Unknown Sources Install Volume,” GOOG-PLAY-007335206.

4. *Dr. Gentzkow's Developer Multi-homing Claim Ignores Constrains on Competition*

247. Dr. Gentzkow makes a similar error in seizing on Fortnite installation data, which I understand he revised in his Supplemental Report based on newly produced data from Epic. Based on that new data, he finds that 21.5% “of all Fortnite installs during the period when Fortnite was available in Google Play” came from alternative Android app stores or direct downloading.<sup>561</sup> When Fortnite launched on Android devices, it was initially not available on the Google Play Store. Nevertheless, Dr. Gentzkow’s own data show that 78.5% of Fortnite downloads came from Google Play when it became available on Play.

248. Dr. Gentzkow also argues that “Android app developers can and do reach users via preinstallation of their apps by OEMs and MNOs” and cites various examples of preloaded apps.<sup>562</sup> As explained above at paragraph, these isolated examples do not prove Google has not foreclosed rivals as they have not had a meaningful impact on Google’s dominance of the Android App Distribution Market. Given space constraints on the device and complaints from OEMs to Google about “bloatware,” this alternative distribution channel would at best provide competition for a small number of apps. Therefore, Dr. Gentzkow fails to show these agreements have allowed “meaningful competition” in the Android App Distribution Market.<sup>563</sup>

**F. Dr. Gentzkow’s Arguments Regarding Prices are Flawed or Irrelevant**

249. Dr. Gentzkow presents a series of analyses to demonstrate that Google Play’s “service fee” (*i.e.*, pricing) structure is effective and prices by several measures have been decreasing. There are several flaws in these analyses and conclusions, which I explain below.

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<sup>561</sup> Gentzkow Supplemental Report, ¶ 6 & Ex. S.1.

<sup>562</sup> Gentzkow Report, ¶ 199.

<sup>563</sup> As stated in my Opening Report, “[b]y erecting roadblocks to each alternative method of Android App Distribution, Google prevents meaningful competition over the distribution of other Android app stores through the Google Play Store by foreclosing channels through which competitors could reach end-consumers, the Android users” ( Rysman Opening Report, ¶ 14).

*1. The Relevant Standard to Evaluate Prices is Competition*

250. Dr. Gentzkow claims that the Google Play “service fee” (*i.e.*, price) is “effective,” if it “allows the platform sponsor to earn an economic return on its investments and innovations while aligning the incentives of platform participants to make decisions in a way that will create value for the platform as a whole.”<sup>564</sup>

251. Dr. Gentzkow presents five factors that he claims indicate whether a service fee is “effective” based on the economic literature (including my own work) and reasoning.<sup>565</sup> First, the service fee structure “needs to be feasible to administer given the information available to the platform sponsor.”<sup>566</sup> Second, effective service fees “tend to be proportional to an app developer’s earnings from eligible transactions rather than a fixed amount that is the same for all app developers.”<sup>567</sup> Third, effective service fees “may be lower for transactions for which marginal costs are large relative to revenue.”<sup>568</sup> Fourth, it may be effective “to charge lower fees as a share of revenue for apps that provide unusually large positive spillovers on other platform participants.”<sup>569</sup> And fifth, “an effective service fee should generally apply to transactions regardless of whether they occur immediately at the time platform participants are matched to each other or significantly later.”<sup>570</sup> He then concludes that: “[t]he service fee structure Google has established for Google Play is consistent with the principles just described and thus shares many of the features we would expect to see in an effective, procompetitive structure that maximizes the total value created for platform participants.”<sup>571</sup>

252. The literature Dr. Gentzkow cites in this section does not support the proposition that the five factors will result in a procompetitive pricing structure. Instead, it primarily provides

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<sup>564</sup> Gentzkow Report, ¶ 137.

<sup>565</sup> Gentzkow Report, ¶¶ 144-153.

<sup>566</sup> Gentzkow Report, ¶ 145.

<sup>567</sup> Gentzkow Report, ¶ 146.

<sup>568</sup> Gentzkow Report, ¶ 148.

<sup>569</sup> Gentzkow Report, ¶ 151.

<sup>570</sup> Gentzkow Report, ¶ 152.

<sup>571</sup> Gentzkow Report, ¶ 154.

insights into the complexity and properties of pricing in two-sided platforms<sup>572</sup> and into the benefit from using revenue share contracts relative to non-sharing contracts in supply chains when demand is uncertain.<sup>573</sup> He cites to this literature in support of the importance of pricing strategies for two-sided platforms where insights from one-sided markets often do not apply,<sup>574</sup> to support the propositions that “effective service fees will tend to be *proportional* to...earnings from eligible transactions rather than a fixed amount”<sup>575</sup> and “may be lower for transactions for which marginal costs are large relative to revenue,”<sup>576</sup> and that an effective price structure charges “lower fees as a share of revenue for apps that provide unusually large positive spillovers.”<sup>577</sup> None of these propositions discuss competition in either of the relevant markets, and the sections referenced in the literature do not discuss the effect of these pricing features on competition.

253. Moreover, in asserting that prices are “effective,” Dr. Gentzkow conflates “effective” with “competitive.”<sup>578</sup> In fact, Dr. Gentzkow does not mention the term “procompetitive” in any of his explanations of the five factors as he presents them. It is only in

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<sup>572</sup> See Jean-Charles Rochet and Jean Tirole, “Platform Competition in Two-Sided Markets,” *Journal of the European Economic Association*, Vol. 1, No. 4, 2003, pp. 990-1029; David S. Evans and Richard Schmalensee, “The Antitrust Analysis of Multisided Platform Businesses,” *Oxford Handbook of International Antitrust Economics*, Vol. 1, 2014, pp. 404-448; Andrei Hagiu, “Two-Sided Platforms: Product Variety and Pricing Structures,” *Journal of Economics & Management Strategy*, Vol. 18, No. 4, 2009, pp. 1011-1043; Thomas Eisenmann et al., “Strategies for Two-Sided Markets,” *Harvard Business Review*, October 2006; and Marc Rysman, “The Economics of Two-Sided Markets,” *Journal of Economic Perspectives*, Vol. 23, No. 3, 2009, pp. 125–143.

<sup>573</sup> See Nelly Bart et al., “Revenue-Sharing Contracts in Supply Chains: A Comprehensive Literature Review,” *International Journal of Production Research*, Vol. 59:21, No. 21, 2021, pp. 6633-6658; Yinliang Tan and Janice E. Carrillo, “Strategic Analysis of the Agency Model for Digital Goods,” *Production and Operations Management*, Vol. 26, No. 4, 2017, pp. 724–741; Yinliang Tan et al., “The Agency Model for Digital Goods,” *Decision Sciences*, Vol. 47, No. 4, 2016, pp. 628-660; Yunzeng Wang et al., “Channel Performance Under Consignment Contract with Revenue Sharing,” *Management Science*, Vol. 50, No. 1, 2004, pp. 34-47.

<sup>574</sup> Gentzkow Report, ¶¶ 138-139.

<sup>575</sup> Gentzkow Report, ¶ 146.

<sup>576</sup> Gentzkow Report, ¶ 148.

<sup>577</sup> Gentzkow Report, ¶ 151.

<sup>578</sup> To the extent that, by “effective,” Dr. Gentzkow means “efficient,” a monopolist who can perfectly price discriminate can achieve an efficient market outcome; the market equilibrium for a perfectly price discriminating monopolist results in the same output level as a competitive equilibrium and therefore statistically efficient. See, e.g., Carlton and Perloff, *Modern Industrial Organization*, Third Edition. pp. 282-283.

summarizing his discussion of these factors that he refers to these factors as showing that Google's service fee is "consistent with an *effective, procompetitive* structure."<sup>579</sup> Just because the price structure is "effective" in the way that Dr. Gentzkow uses this term (such as fees being proportional to developer earnings or fees being lower for transactions with high marginal costs relative to revenue) does not mean that Google operates in a competitive market or lacks market power, nor that these pricing choices enhance competition. For example, a monopolist and a firm operating in a competitive market can both impose a service fee structure that is "feasible to administer given the information available." Thus, this factor sheds no light on whether a market is competitive. In addition, Dr. Gentzkow has not shown that his "effective" price is not consistent with anticompetitive conduct such as prices that result in foreclosure.

254. Moreover, any firm should desire "effective" prices whether it has monopoly power or not. The relevant question is whether price *levels* have been set through competition. But Dr. Gentzkow's discussion conflates pricing structure with price level. For example, Dr. Gentzkow states that "app developers make many decisions that will be impacted by the structure of the service fee ...[including choosing] whether to develop for Android at all..." "what channel(s) to distribute through within Android," "how much to invest in developing and supporting their app and enhancing its quality," [and] "set[ting] the prices that users pay for downloads and in-app purchases."<sup>580</sup> For decisions such as determining how much to invest, app developers need to know the magnitude of the price, not just the form that the price will take.

255. Therefore, Dr. Gentzkow's opinions about the "effectiveness" of Google's price structure are simply beside the point.

## 2. *Dr. Gentzkow Overlooks that Google Already Negotiates with Developers*

256. Under the first factor Dr. Gentzkow presents for an effective service fee, he also states that "[a]ny structure that required the platform to individually tailor or negotiate a different

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<sup>579</sup> Gentzkow Report, ¶ 154, 154a, 154b, 154c, 154d, 154e, and 154f.

<sup>580</sup> Gentzkow Report, ¶ 140.



service fee for each of the millions of apps on its platform would be costly to administer.”<sup>581</sup> However, subjecting Google Play to competition would not require individual negotiations for every app, as Google could simply offer a lower, competitive commission rate to all developers.

257. In any event, the concern Dr. Gentzkow raises is moot. Google already negotiates and tailors its service fee in limited instances, for example, when it has faced pressure from important developers.<sup>582</sup>

258. Moreover, as noted in my Opening Report, it is widely accepted in economics that price discrimination – such as Google charging certain developers a higher commission rate than other developers – can occur only if a firm has market power.<sup>583</sup>

### 3. *Dr. Gentzkow’s Claims about Mobile Device Prices are a Red Herring*

259. Dr. Gentzkow claims that decreasing Android mobile device prices indicate vigorous competition.<sup>584</sup> However, decreasing prices for Android *mobile devices* do not have any bearing on an analysis of competition in the *Android App Distribution Market*. There is no evidence that prices set in the Google Play Store have any effect on pricing for Android mobile devices. As I noted in my Opening Report, when purchasing smartphones, consumers do not consider all the apps and in-app content they will purchase during the life of the phone; thus, consumers’ inability to lifecycle price demonstrates Android mobile device prices are not the relevant metric to evaluate Google’s conduct in Android App Distribution. Even if Play Store price affects pricing for Android mobile devices, the job of economists is to understand what the competitive effects are in the well-defined relevant markets. I do not define a smart mobile device market. Even if I did, the conduct I have reviewed is directed at the two markets I

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<sup>581</sup> Gentzkow Report, ¶ 145.

<sup>582</sup> Rysman Opening Report, ¶¶ 107, 468 and Exhibit 16.

<sup>583</sup> Rysman Opening Report, ¶ 286. *See*, Varian, Hal R, "Price discrimination," in *Handbook of Industrial Organization*, Vol 1, Eds. R. Schmalensee and R.D. Willig, Elsevier Science Publishers B.V., 1989, pp. 597-654, available at [https://doi.org/10.1016/S1573-448X\(89\)01013-7](https://doi.org/10.1016/S1573-448X(89)01013-7).

<sup>584</sup> Gentzkow Report, ¶¶ 28, 161 (“Standard economic indicia for the Android ecosystem are consistent with vigorous competition,” including “quantities of both Android devices and Android app transactions have increased dramatically, while device prices have fallen dramatically.”).

propose; Dr. Gentzkow's claimed procompetitive effects are realized, if at all, outside of these markets. Indeed, no economist in this case, including Drs. Gentzkow and Tucker, has defined a relevant antitrust market of smart mobile devices. Thus, mobile device prices are not the correct prices to evaluate; rather, prices (or fees) for distributing apps on Android and in-app purchasing are the appropriate metric to consider in determining whether Google's challenged conduct was anticompetitive.

4. *Dr. Gentzkow's Average Commission Rate is Incorrect and Misleading*

260. Dr. Gentzkow claims that recent declines in Google's average commission are "consistent with an innovative market that produces large social surplus, and the opposite of what economists would typically expect when a dominant firm had foreclosed competition in order to enrich itself at the expense of consumers."<sup>585</sup> He contends "that the average service fee rate paid by the minority of U.S. app developers that did pay service fees remained roughly constant at approximately 30 percent during Android's early history and has subsequently fallen as Google introduced lower-fee tiers for subscriptions and smaller app developers."<sup>586</sup> As support, in Exhibit 4, he presents the average commission paid by U.S. app developers that paid a commission to Google, which shows a declining commission rate since 2018 with a steeper decline in 2021. There are several issues with Dr. Gentzkow's analysis.

261. First, Dr. Gentzkow presents the average commission as a simple average and does not account for the amount of consumer spend at those commission rates. However, a proper calculation of what has happened to Google's commission would weight by the consumer spend to which the commission applies. Only then can one understand the overall impact of the change in commission on developers and consumers (rather than over-emphasizing a commission rate reduction that applies to very few transactions).

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<sup>585</sup> Gentzkow Report, ¶¶ 155, 162, and Exhibit 4.

<sup>586</sup> Gentzkow Report, ¶ 162.

262. Second, the data used by Dr. Gentzkow in his average commission calculation contains transactions for U.S. developers and worldwide consumers; thus, he may exclude data for transactions between non-U.S. developers and U.S. consumers.<sup>587</sup> However, there is no reason to limit commission rates to those paid by *U.S.* app developers in calculating Google's average commission to developers. As I explained in my Opening Report, app developers have an incentive to reach all Android users and are not limited in distributing their apps to Android users in their own geographic location.<sup>588</sup> Thus, even if the geographic market is limited to Android smart mobile device *users* in the U.S., as Google's consultant Dr. Tucker claims, app developers outside the U.S. have an incentive to distribute apps to these U.S. consumers and, thus, Google's average commission should include non-U.S. developers that distribute to U.S. consumers.

263. Correcting for these errors, I demonstrate that Google's recent commission rate changes have less of an impact than Dr. Gentzkow contends. Exhibit 13 below compares the commission rate as calculated by Dr. Gentzkow in the chart on the left panel to the commission rate corrected for the errors noted above on the right panel. While Dr. Gentzkow shows a precipitous decrease in 2021, I demonstrate that Google's average commission rate, despite Google's recent commission rate changes, decreased to only about █% before increasing again.<sup>589</sup> Interestingly, Dr. Leonard's counterfactual rate of █% is similar to Google's actual average commission rate.<sup>590</sup>

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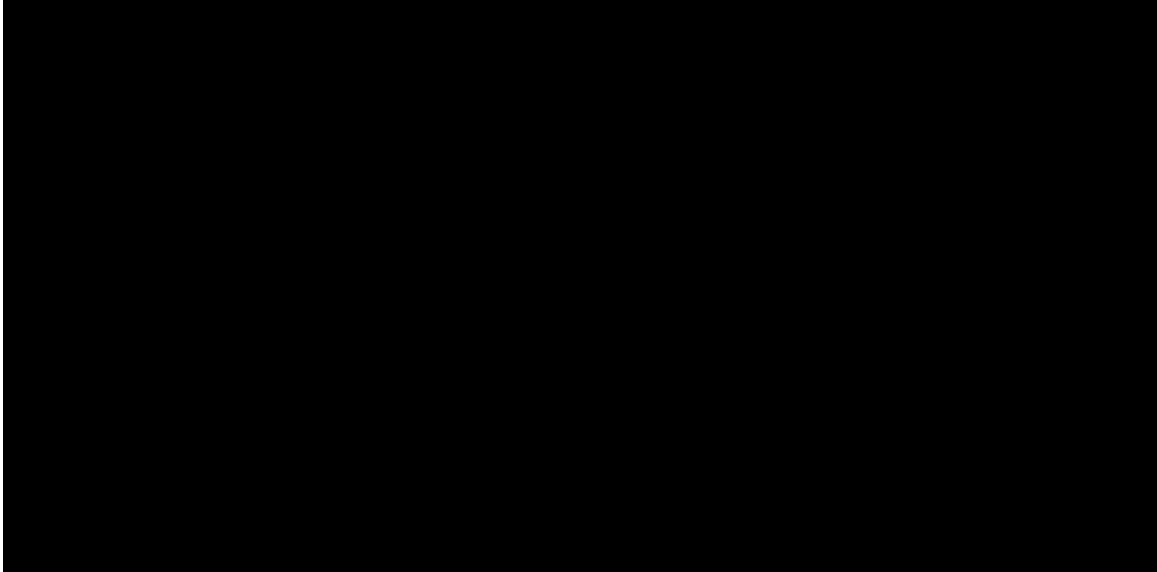
<sup>587</sup> For example, █ and █ are in Google's monthly app revenue data for U.S. consumers and worldwide developers (the data I use) but not in Google's monthly app revenue data for U.S. developers and worldwide consumers (the data Dr. Gentzkow uses). In some instances, an app partially containing the app name appears in the U.S. developers data used by Dr. Gentzkow, but they are associated with developer names that do not contain the developer of that app, thereby indicating they are not the original app. *See* Rysman Rebuttal Report Workpapers.

<sup>588</sup> Rysman Opening Report, ¶ 232.

<sup>589</sup> Rysman Opening Report, ¶ 286.

<sup>590</sup> Leonard Report, ¶ 178.

**Exhibit 13**  
**Google's Average Commission, 2012-2021**  
**Dr. Gentzkow's Exhibit 4**  
**Original (left) vs. Corrected (right)**



*Notes:*

1. App developer quarterly service fee rates that are zero, negative or greater than 100% are excluded from the calculation of the average service fee rate.
2. Simple average service fee rates are computed as the arithmetic average of app developer specific service fee rates in a given quarter. Data used is U.S. developers and their revenue from users worldwide.
3. Weighted average service fee rates are computed as a weighted average of app developer specific service fee rates, using the transaction dollars to which that service fee rate was applied as weights. Data used is worldwide developers and their revenue from users in the U.S.

*Sources:* GOOG-PLAY-005535886; GOOG-PLAY-005535885; GOOG-PLAY-010801689; GOOG-PLAY-010801688.

264. Moreover, these rates do not account for the revenue sharing payments to mobile carriers that Google phased out over time. As I described in my Opening Report, Google initially provided 25% revenue sharing payments to mobile carriers, thereby keeping only 5%, but phased out those payments, eliminating them by 2018.<sup>591</sup> Exhibit 37 of my Opening Report depicts the decline in average revenue share across mobile carriers from 2012 to 2019. Deducting the declining average carrier revenue share depicted in Exhibit 37 of my Opening Report from

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<sup>591</sup> Rysman Opening Report, § IV.B.5 and Exhibit 15. ¶¶ 289-290 and Exhibit 37.

Google's average commission depicted above would thus show Google's average commission that it retained was increasing during that period.<sup>592</sup>

265. Dr. Gentzkow also contends that "the share of new apps in Google Play that pay service fees to Google" is another measure of price and that its decrease over time is evidence of competition; in Exhibit 4 of his report, he plots the share of new apps published worldwide in Google Play to which service fees apply.<sup>593</sup> There are several issues with his Exhibit 4.

266. First, the app catalog data Dr. Gentzkow uses for this analysis is a snapshot of apps on the Google Play Store as of June 2021 and, consequently, would exclude apps that had exited the Google Play Store prior to this time.<sup>594</sup> To the extent that the apps missing from these data contain a higher share of new apps to which service fees apply, Dr. Gentzkow's chart would show a more aggressive decline in the share of new apps to which service fees apply than the actual change. Indeed, the monthly app revenue data contain apps that are not included in the app catalog data that Dr. Gentzkow uses for his analysis,<sup>595</sup> thereby demonstrating the data upon which Dr. Gentzkow's claim that the share of new apps that pay service fees to Google decreased over time is incomplete.<sup>596</sup> Thus, his claim that this decrease is evidence of competition is invalid.

267. Second, Dr. Gentzkow ignores that the vast majority of new apps with paid transactions in his analysis still pay a 30% commission rate, as depicted in below Exhibit 14. I compare the new apps to which service fees apply in the data used by Dr. Gentzkow to Google's

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<sup>592</sup> Rysman Opening Report, § IV.B.5 and Exhibit 15. ¶¶ 289-290 and Exhibit 37.

<sup>593</sup> Gentzkow Report, ¶ 162 and Exhibit 4.

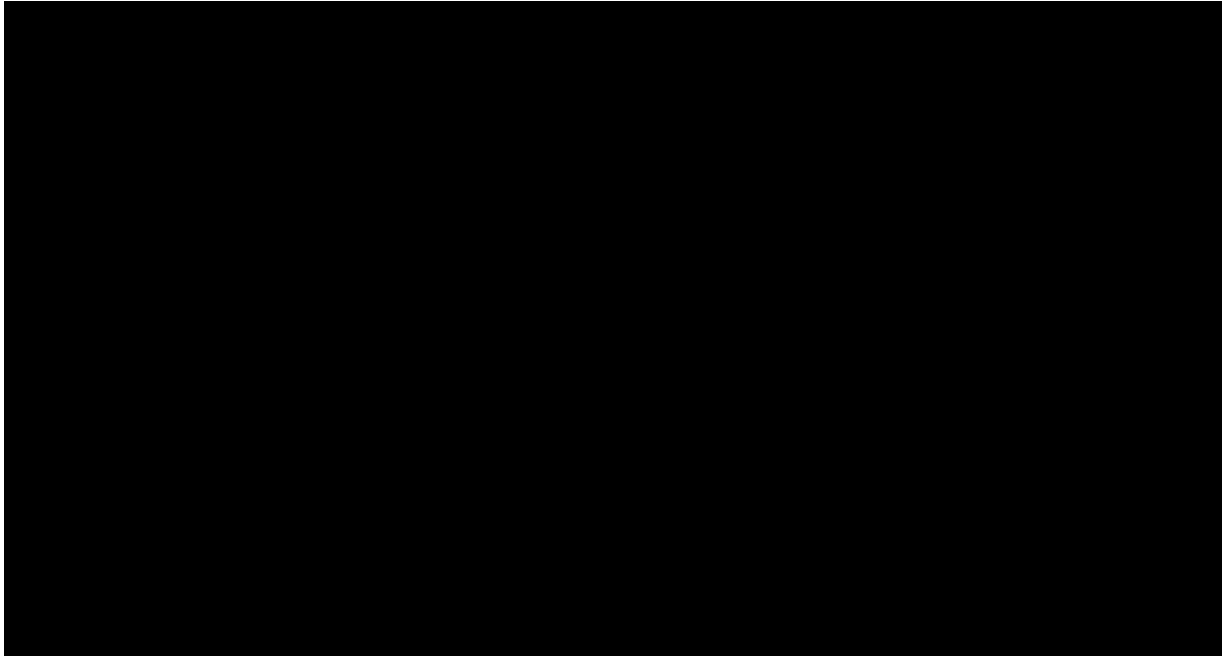
<sup>594</sup> Letter from Brian C. Rocca to Melissa R. Coolidge, October 8, 2021, p. 2 (stating "[i]t is possible there are apps identified in transactions in GOOG-PLAY-005535885 through GOOG-PLAY-005535890 that have been removed from Play. For example, if purchases were made related to an app in 2020, but that app has since been removed, it would not have been listed in GOOG-PLAY-001507601 since that pull was as of June 2021." It also confirms that "for apps found in GOOG-PLAY-005535885 through GOOG-PLAY-005535890, but not found in GOOG-PLAY-001507601...[a]pp removal from Play Console is the only reason we are aware of.").

<sup>595</sup> See Rysman Rebuttal Report Workpapers.

<sup>596</sup> It is also the case that Google's app catalog data contain apps that are not included in Google's monthly app revenue data, further clouding the impact on his analysis.

monthly app revenue data to identify the commission rate that applied at the first transaction for each new published app with fees in Dr. Gentzkow's data source, which shows that most apps still pay a 30% commission.

**Exhibit 14**  
**The Majority of New Apps with Paid Transactions Pay a 30% Commission**



*Notes:*

1. Shares are calculated by dividing the number of apps published in a given quarter at a given commission by all apps published in that quarter that pay service fees.
2. Service fees over 100% are excluded.

*Sources:* GOOG-PLAY-005535886; GOOG-PLAY-005535885; GOOG-PLAY-010801689; GOOG-PLAY-010801688; GOOG-PLAY-001507601; GOOG-PLAY-001507602.

268. Finally, in addition to including apps for which there is no monthly app revenue, the data Dr. Gentzkow uses for his Exhibit 4 chart also contains unpublished and suspended apps. Of the apps in his Exhibit 4 new apps chart, only 25% of apps are published, whereas 20% are unpublished and 55% are suspended.<sup>597</sup> I understand that unpublished and suspended apps

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<sup>597</sup> See Rysman Rebuttal Report Workpapers.

may be unable to engage in transactions.<sup>598</sup> Therefore, the commission rates that apply to them are not nearly as probative as Dr. Gentzkow claims.

269. The share of new apps to which service fees apply [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED], contrary to what one might conclude from Dr. Gentzkow's Exhibit 4.

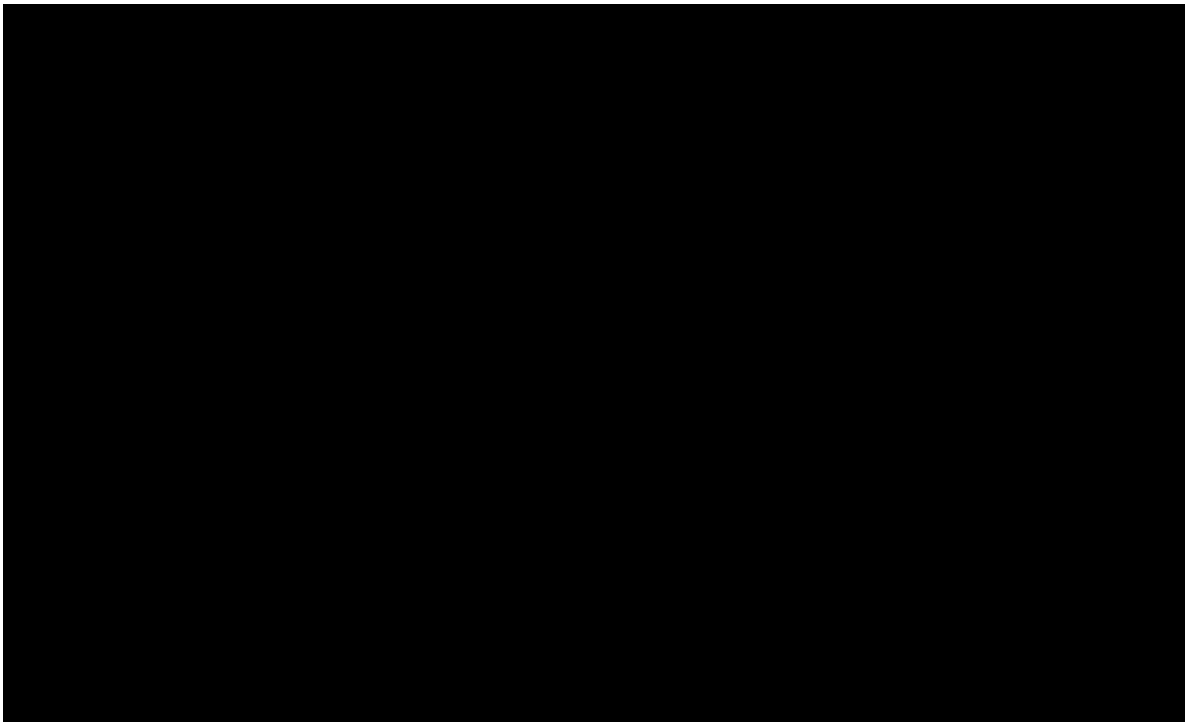
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<sup>598</sup> See Play Console Help, Google, "My App Has Been Removed from Google Play," <https://support.google.com/googleplay/android-developer/answer/2477981?hl=en#zippy=%2Csuspensions> (explaining that suspended apps are removed from Google Play and that once an app is suspended it "forfeit[s] the users, statistics, and ratings of the removed application" and that "If your app has been removed or suspended from Google Play, its users may receive a push notification from Google Play Protect informing them of this change and giving them the option to remove the app from their device. Users will also have the option to keep the app."); Play Console Help, Google, "Update or Unpublish Your App," <https://support.google.com/googleplay/android-developer/answer/9859350?hl=en> ("When you unpublish an app, existing users can still use your app and receive app updates, but new users won't find and download it on Google Play.").



**Exhibit 15**

**Dr. Gentzkow's Exhibit 4 (New Published Apps to Which Service Fees Apply Chart)  
Contains Many Apps that are Unpublished and Suspended**



*Notes:* Data is limited to the dates Dr. Gentzkow used for Exhibit 4 (New Published Apps to Which Service Fees Apply Chart).

*Sources:* GOOG-PLAY-001507601; GOOG-PLAY-001507602

270. Finally, Dr. Gentzkow ignores what prices would have been absent Google's conduct. Even assuming for the sake of argument that his presentation of the changes in Google's commission rate is accurate, the proper question is what would have happened to Google's commission rate in a world absent Google's challenged conduct. As I demonstrated in my Opening Report, in the limited instances in which Google faced pressure from certain important developers and thus some very limited competition, Google profitably charged a much lower commission rate.<sup>599</sup> Thus, in the but-for world in which all apps benefit from competition in both markets, commission rates for all apps would similarly decrease.

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<sup>599</sup> Rysman Opening Report, § VIII.A.4.

5. *Dr. Gentzkow's Comparison of Commission Rates of Alternative Mobile App Stores is Misleading*

271. Dr. Gentzkow contends that the “rates publicly reported or presented to app developers” by alternative mobile app stores should be compared with Google’s published rates “for consistency of comparison.”<sup>600</sup> Exhibit 10 of his report presents such rates for a selection of mobile app stores. However, what is relevant are the rates developers actually pay, and, thus, the net commission rate should be the point of comparison. Comparing published commission rates across app stores is akin to comparing list prices when discounted prices are what customers actually pay, particularly when customers can negotiate rates/discounts. Dr. Gentzkow recognizes this point in that his entry for the Samsung Galaxy Store in Exhibit 10, which states “30% (*or otherwise agreed upon*)” pointing out the example of “Epic negotiat[ing] a 12 percent service fee for the Galaxy Store.”<sup>601</sup> Nonetheless, he ignores this fact in concluding the published rates should be compared “for consistency.”<sup>602</sup> As I noted in Section IV.B.1 and Exhibit 5 above,

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██

██████████. As Exhibit 5 above illustrates, Google’s average commission rate during the period 2018-2021 declined from ██████% to ██████% while the average commission rates paid by developers on the Amazon Appstore and Samsung Galaxy Store during the same period ranged from ██████% to ██████% and from ██████% to ██████%, respectively.

**G. Dr. Gentzkow’s Procompetitive Justifications are Flawed**

272. Dr. Gentzkow claims that Google’s challenged conduct is needed to “address a set of collective action problems that arise on smart device platforms because many participants individually have incentives to behave in ways that do not maximize the value of the platform for all participants.”<sup>603</sup> He lists these four problems as “(i) coordinating early adoption and

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<sup>600</sup> Gentzkow Report, ¶¶ 170-171 and Exhibit 10.

<sup>601</sup> Gentzkow Report, Exhibit 10 (emphasis added).

<sup>602</sup> Gentzkow Report, ¶ 171.

<sup>603</sup> Gentzkow Report, ¶ 26.

investment, (ii) avoiding fragmentation, (iii) safeguarding security, and (iv) strengthening the Android brand by delivering a clean, consistent, and high-quality ‘out-of-the-box’ experience for users.”<sup>604</sup> The first point is that, similar to his five-factor test created to demonstrate Google’s commission structure is “effective,” Dr. Gentzkow appears to create these factors to fit Google’s business, as it is not grounded in economic analysis. Nonetheless, I consider Dr. Gentzkow’s evidence under each of these four factors below.

*1. Dr. Gentzkow’s Claim that Google’s Challenged Conduct Resolves Fragmentation Fails to Recognize Important Evidence*

273. Dr. Gentzkow opines that the challenged Google conduct is justified by a procompetitive benefit of overcoming fragmentation.<sup>605</sup> To the extent that fragmentation is associated with competition, it is possible for the benefits of competition to outweigh the benefits of coordination on a single proprietary network.<sup>606</sup> Furthermore, as I discuss below, other platforms, too, could have addressed any efficiency costs of fragmentation but for Google’s conduct that prevented them from competing effectively against the Google Play Store.

*a) OS Fragmentation*

274. Dr. Gentzkow claims that Google’s RSAs and ACC/AFA are procompetitive because they overcome “device fragmentation,” which he defines as a “situation in which the devices in the ecosystem are incompatible or only partly compatible with each other—i.e., they do not share a common baseline set of core capabilities and features that app developers rely on.”<sup>607</sup> My report is about the app distribution market. Whether OS fragmentation is beneficial for the market or not, and whether Google’s behavior towards OS fragmentation is anticompetitive or not, is outside the bounds of my opinion.

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<sup>604</sup> Gentzkow Report, ¶ 26.

<sup>605</sup> Gentzkow Report, ¶¶ 26, 104, 105 and §§ VII.B, IX.B; see also Chatterjee §§ III, IV.C, V.C-V.D.

<sup>606</sup> See Rysman (2004).

<sup>607</sup> Gentzkow Report, ¶ 104.

275. Even accepting fragmentation as a valid procompetitive critique, in the absence of the challenged conduct, other competitors could have succeeded in developing cross-platform solutions that would have overcome device fragmentation. Qualcomm, for example, is a technology company that developed CDMA and contributed to other wireless standards such as 4G LTE and 5G.<sup>608</sup> In 2001,<sup>609</sup> Qualcomm launched “BREW,” or Binary Runtime Environment for Wireless,<sup>610</sup> a mobile platform for creating apps<sup>611</sup> that Qualcomm made available at first to devices on CDMA networks, and then more broadly.<sup>612</sup> Qualcomm also had a mobile app store, first called the BREW Delivery System, which eventually became Plaza Retail.<sup>613</sup> Plaza Retail originally distributed only BREW apps, but expanded to offer Java apps to devices on other mobile OSs,<sup>614</sup> such as PalmOS devices.<sup>615</sup> Qualcomm had on its 2009 roadmap plans to extend Plaza Retail to offer apps for Android, Windows Mobile, Symbian, and BlackberryOS.<sup>616</sup>

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<sup>608</sup> Vogelsang Deposition, pp. 10-11 (“Q. Did Qualcomm have anything to do with CDMA? A. We did. We pioneered the technology. We brought it [to] market. ...Q. Any other technologies that Qualcomm [has] pioneered that come to mind? A. ... Sure. Technologies like LTE and ... 5G technologies for cellular.”).

<sup>609</sup> Vogelsang Deposition, p. 32 (“Q. When did Qualcomm launch BREW? A. As I recall, it was in 2001.”).

<sup>610</sup> Vogelsang Deposition, p. 14 (“Q. What does the acronym BREW stand for? A. It stands for Binary Runtime Environment for Wireless.”).

<sup>611</sup> Vogelsang Deposition, pp. 13-14 (“Q. What is BREW? A. BREW is a platform for creating applications on mobile devices, and it’s – it was also a delivery system and app store for enabling mobile operators to offer these kinds of app store services to their consumers.”).

<sup>612</sup> Vogelsang Deposition, p. 32 (“Q. And how was BREW related to CDMA? A. BREW is independent of CDMA. However, it’s related in the sense that we delivered BREW to CDMA devices in this time period.”).

<sup>613</sup> Vogelsang Deposition, 16 (“Q. Mr. Vogelsang, a moment ago you were describing the app store infrastructure provided to operators in a while-label fashion. Did Qualcomm have a name for that product or platform? A. Yes. The name evolved over the course of the product’s lifetime. But in general, it was referred to as the BREW delivery system and then evolved to what was eventually called Plaza Retail.”).

<sup>614</sup> Vogelsang Deposition, pp. 48-49 (“Q. During the time where you were the head of product management for Plaza Retail, during that time, did Plaza Retail work on multiple mobile operating systems? A. ...So at this time, as I recall, the lion’s share, the majority of the operating systems we were deploying to were BREW, but we were deploying Java applications, so non-BREW applications, both to BREW devices and eventually non-BREW devices. But I don’t – I don’t recall the exact time frame. I think it’s after 2009.”).

<sup>615</sup> Stephen Lawson, Stephen, NetworkWorld, “Qualcomm Extends BrewREW to Download PalmOS Apps,” *NetworkWorld*, (March 18, 2003), available at <https://www.networkworld.com/article/2340802/qualcomm-extends-brew-to-download-palmos-apps.html>.

<sup>616</sup> PX2692, “Plaza Retail Overview,” June 2009, QCUTAH05227\_0000001-094, at -007.

Qualcomm marketed Plaza Retail as platform-neutral or “platform agnostic,”<sup>617</sup> meaning that it would support apps on a variety of mobile OSs.

276. Qualcomm first offered its app stores as white-label solutions to MNOs.<sup>618</sup> According to Qualcomm, its BREW mobile app stores helped developers overcome device fragmentation by publishing a single time to Qualcomm’s app marketplace, from which MNOs could choose the apps they wanted in their stores.<sup>619</sup> I understand that Qualcomm pitched Plaza Retail to a variety of MNOs that never became customers of Qualcomm’s app store on Android devices, including AT&T, T-Mobile, Rogers, and América Móvil.<sup>620</sup> As I explained in my Opening Report, Google had, between 2009 and 2014, entered agreements with T-Mobile, Rogers, and América Móvil that contained exclusivity clauses preventing the preloading of competing app stores by third parties.<sup>621</sup> In addition, Google’s RSAs with MNOs disincentivized them from investing in their own first-party app stores. Although Qualcomm’s corporate designee testified that Qualcomm did not know why MNOs, including networks that were customers of Qualcomm’s app stores on non-Android devices, never became customers of Qualcomm’s app stores for Android devices, non-Android devices were not subject to Google

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<sup>617</sup> See San Diego Business Journal, “Qualcomm Rolls Out Platform-Agnostic App Store,” May 18, 2009, available at <https://www.sdbj.com/imported/qualcomm-rolls-out-platform-agnostic-app-store/> (“‘It’s completely agnostic. The good thing for Qualcomm is that it opens up a much larger market for us,’ said marketing director Sunni Tweet, who added that Plaza Retail will also work on phones without Qualcomm-designed chipsets.”); Vogelsang Deposition, p. 49 (“Q. I’m just asking if Qualcomm has used the phrase ‘platform agnostic’ to describe BREW or its app stores? . . . A. I think that – that Qualcomm, when speaking about its app store . . . in this time frame, we had intended for the app store to support different platforms, different device platforms beyond BREW-based, BREW MP-based platforms. So, yes, I could see us describing Plaza Retail that way.”).

<sup>618</sup> Vogelsang Deposition, p. 15 (“And then, also, an app store infrastructure that was provided to operators. And they in turn – it was provided in a – sort of a white-label fashion and operators would offer their own services direct to consumer powered by the BREW delivery infrastructure, the app store infrastructure.”).

<sup>619</sup> Vogelsang Deposition, pp. 51-52 (“Q. How did Qualcomm’s app store help developers overcome fragmentation? A. Qualcomm’s app store helped developers reach a large number of devices so they could publish their application to – to many devices. Q. And were developers able to reach a large number of devices using Qualcomm’s app store without needing to go through a different process for distribution on each device? . . . A. Yes. So developers publish to a marketplace, and then operators selected the applications that they wanted from the marketplace for their stores.”).

<sup>620</sup> Vogelsang Deposition, pp. 68-74. Verizon briefly used the system that evolved into Plaza Retail. See Vogelsang Deposition, p. 68.

<sup>621</sup> Rysman Opening Report, ¶ 374.

agreements, and so MNOs would have had greater incentives to use Qualcomm’s app stores for those devices, all else equal.

b) App Store Fragmentation

277. Dr. Gentzkow refers to the second form of fragmentation as *app store fragmentation*, which “occurs when no app store(s) contain a comprehensive set of apps and many app stores are accessible only to certain groups of users. Just like device fragmentation, this creates inefficiency because it prevents users from efficiently transacting with the full range of app developers and vice versa.”<sup>622</sup> Importantly, Dr. Gentzkow recognizes that “fragmentation does not increase just because more app stores enter, existing app stores become more successful, and/or app distribution becomes more competitive.”<sup>623</sup> Furthermore, as mentioned in my Opening Report, Google’s challenged conduct prevented potential open-source platforms designed to overcome fragmentation, such as One Platform Foundation.<sup>624</sup>

278. In my Opening Report, I explained how the One Platform Foundation—a consortium of rival Android app stores including Appland, SlideME, GetJar, and Yandex—sought to develop a common Android in-app billing services SDK called OpenIAB, which was never realized.<sup>625</sup> However, the One Platform Foundation did succeed in bringing to market the

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<sup>622</sup> Gentzkow Report, ¶ 105.

<sup>623</sup> Gentzkow Report, ¶ 105.

<sup>624</sup> See, Rysman Opening Report, ¶ 521 (citing Christopoulos Deposition, p. 58 (“Q. The third bullet point says, quote, Move toward implementing OpenIAB For in-app payments for multiple stores, including SlideME, Amazon, Samsung and others was OpenIAB? A. Yes. It’s what we talked about before. OpenIAB was an initiative by this group of developers or teams – and we were involved with it – to be able to combat this fragmentation problem that Google was causing. And this was to- it’s an open in-app billing system. The words say it. The title says it.”); 92:5-16 (“A lot of effort, a lot of development and a lot of time wasted, and the end result was only AppDF made it through. OpenIAB didn’t make it through. And I think one of the reasons was because of changes of Google. If Google had to make changes all the time, it was always playing catching up and always updates and then developers have update and would become a nightmare and adding more to the fragmentation problem instead of trying to resolve it.” [as stated]); Christopoulos Deposition, pp. 58-59 (“It’s basically a developer would take this Open[IAB] module or SDK, use that within their app – their Android app when they develop it, and this one build – final build of the Android app will be - - would be able to be distributed to the different app stores out there that were supported by Open[IAB], including the Google Play Store or Android Market back then – I’m not sure of the time line – SlideME, Amazon and so forth. So it was a nice initiative.”)).

<sup>625</sup> Rysman Opening Report, ¶ 521.

“AppDF Editor,”<sup>626</sup> which allowed developers to upload the .apk file, text descriptions, and promotional images such as the app icon and screenshots,<sup>627</sup> for their apps to a single repository with the One Platform Foundation, which would then simultaneously distribute the app in the format accepted by all of the member app stores.<sup>628</sup> The AppDF functionality is illustrated below in Exhibit 16.

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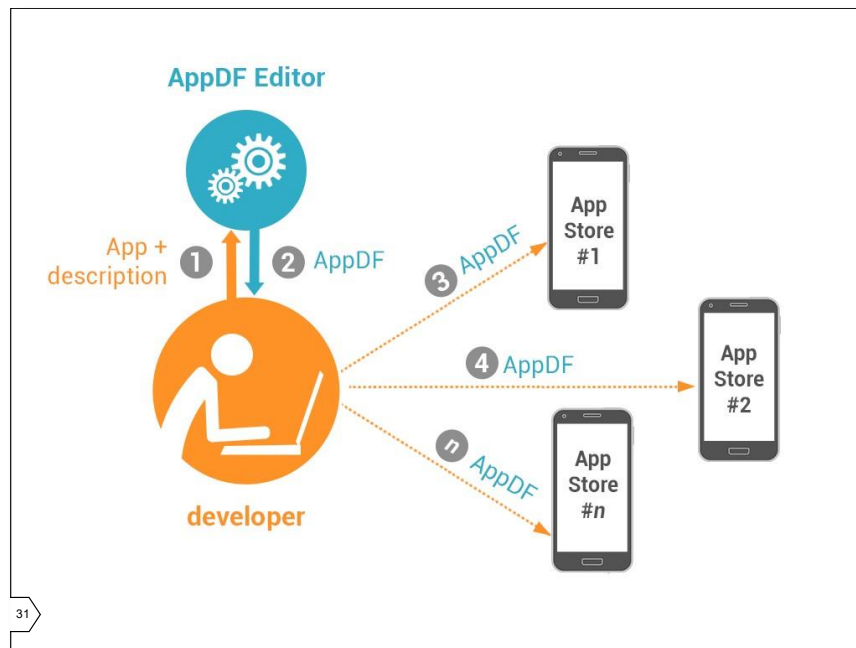
<sup>626</sup> Christopolous Deposition, p. 92 (“[T]he end result was only AppDF made it through.”); *id.* pp. 104-105 (“You stated before that AppDF – SlideME did complete work on AppDF; is that right? A. Yes. We – that part of the project was completed by the whole team and AppDF was available and we still support it today.”).

<sup>627</sup> See PX1586, “Yandex: One Platform Foundation,” SLIDE-PLAY-0066, at 092 (native); One Platform Foundation, AppDF, Github, available at <https://github.com/onepf/AppDF> (accessed Dec. 21, 2022); Christopolous (SlideME) Deposition, pp. 90-93 (“Q. What was the One Platform Foundation? A. It was an initiative by the developers that we were often invited to participate [in] which basically addressed two projects within it. One of them basically called App DF which basically meant that the Android app would be built with a schema within it, that when you submit it to the app store, the assets – additional assets such as screen shots, icons that you need to submit, would all be in a format – unified format – a standard, if you like, that would be acceptable to other app stores.”).

<sup>628</sup> Christopolous (SlideME) Deposition, pp. 90-91 (“So if the developer prepared the app in a special format, where there are additional asset[s] such as description, icons, screen shots, they would take this bundle, this the zip file and they would submit to SlideME . . . or these other app stores and it would be read. So it will make it easy for app developers to submit their app in different stores, including the Google Play Store.”).



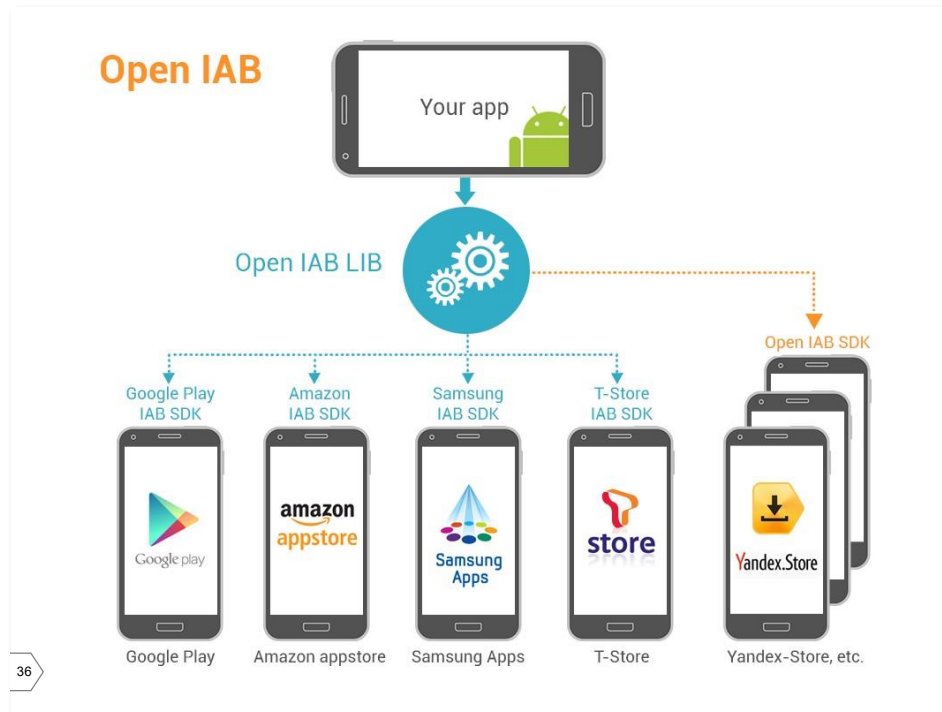
**Exhibit 16**  
**AppDF Functionality**



Source: PX1586, “Yandex: One Platform Foundation,” SLIDE-PLAY-0066, at 096 (native).

279. Another graphical representation depicted in Exhibit 17 shows that Open IAB would work similarly for in-app billing, giving developers a one-stop shop for both app distribution to multiple Android app stores and a billing services solution on every store.

**Exhibit 17**  
**OpenIAB is a One-Stop Shop for In-App**  
**Billing Services for Multiple App Stores**



Source: PX1586, “Yandex: One Platform Foundation,” SLIDE-PLAY-0066, at -101 (native).

280. Together AppDF and OpenIAB would “eliminate fragmentation” from multiple app stores from the developer’s standpoint.<sup>629</sup> But I detailed in my Opening Report how the app

<sup>629</sup> Christopolous Deposition, p. 110; *see also id.* at p. 161 (“Q. The One Platform Foundation was an effort by SlideME and others to combat fragmentation on the Android ecosystem? A. Yes. . . .”); *id.* at pp. 105-106 (“Q. And is this diagram — if you tell me what this diagram represents? A. Right. So it shows a developer preparing his application. One, you know, providing a, let’s say, a text file of the app description through the AppDF editor and to the rest of the elements to the screen shots and so forth, so app plus description. So it generates to — it creates an AppDF file. Think of it as an XML file . . . And then this AppDF file, which references the app description, the screen shot, file names, and so forth along with the Android APK, is able to be distributed to app store one, app store two, app store three, and to make it really easy for the app developers to distribute their apps to different stores.”); *id.* at p. 97 (“Q. You said that these were supported by the One Platform Foundation. What do you mean by that? A. In other words, if the AppDF model for app submission, they had to — every app store has their own form. So for the AppDF to support that form for the app submission, they would have to read that form and support it. That means it would be compatible. . . . So what . . . One Platform Foundation people did — or developers, they went to the Samsung App Store, for example, looked at the — looked at the app submission form and built supportive technology so the submission can be handled without any issues.”).

stores that were prospective members of this alliance—including SlideME and Amazon—were foreclosed from competition because of Google’s conduct. As a result, the constituent members that could have standardized AppDF and OpenIAB exited or were circumscribed in their ability to grow.<sup>630</sup>

c) Dr. Gentzkow Ignores Evidence from China

281. Dr. Gentzkow argues that the fragmentation issues are highlighted by the situation in China, where “[t]he high degree of incompatibility and fractured distribution in China means that app developers have to adapt their apps to several distinct device hardware configurations including, for example, different push services varying across devices, and different app store policies or app update mechanisms.”<sup>631</sup> He then produces evidence that suggests “Chinese app stores often charge fees that are higher than those of Google Play,” illustrating that “in a two-sided market fragmentation across a large number of app stores need not enhance competition or result in lower prices.”<sup>632</sup>

282. Dr. Gentzkow ignores important idiosyncrasies about China in drawing this comparison. As one app localization guide notes: “Get prepared to enter a new market, where everything is different – from pricing strategies to business models and buying habits. Knowing if you have a chance to sell in a place where people have different interests from your current customers is essential, especially if you’re looking for profits and global success.”<sup>633</sup> This suggests that Dr. Gentzkow’s argument that because prices are sometimes higher in China, competition should be restrained everywhere is unsupported and facile.

283. Dr. Gentzkow also ignores important facts about how the fragmented nature of the Chinese app store market fosters innovation, including evidence from a Google document he

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<sup>630</sup> Christopolous (SlideME) Deposition, p. 105 (“Q. And so AppDF is still operational? A. Not from a developer standpoint. It’s – the whole prog project is done. It’s just basically – we still . . . have it even implemented within SlideME. It’s still there. We haven’t, you know, pulled down the parts that support it in our store.”).

<sup>631</sup> Gentzkow Report, ¶ 642.

<sup>632</sup> Gentzkow Report, ¶ 643.

<sup>633</sup> Phrase, “Your Guide to App Localization for the Chinese Market (Part 1),” available at <https://phrase.com/blog/posts/beginners-guide-app-localization-chinese-market/>.

relies on for his claims regarding China's app fragmentation. For example, the flexible nature of the app economy has allowed mini-programs to develop, which are "tiny app versions" that are "used within WeChat and other services" to "help users interact with stores and games," which if developers can adapt to, they "will enjoy fewer restrictions and succeed."<sup>634</sup> Mini-programs have also spawned competitors, such as quick apps, which have an "'install-less' user interaction model" with a "[u]nified development and app distribution platform across Android OEMs and their user surfaces (app stores, search, etc.)" and are "blessed by the OEMs themselves [and] have a clear path towards solving those developer-facing [fragmentation] problems...by abstracting away the underlying complexity[]" (e.g. letting Quick Apps be installed without friction, supporting Push, etc.)."<sup>635</sup> In addition, a report by McKinsey & Company about the future of digital innovation in China notes China has a "digital ecosystem that fosters innovation," which has spawned, for example, "so-called super apps" with "advanced digital payments services" that boast "massive user bases and high-frequency engagement, enabling their developers to divert huge traffic into a portfolio of offerings, hosted in-house or via partners."<sup>636</sup>

## 2. *Dr. Gentzkow's Security Rationale is Flawed*

284. Dr. Gentzkow claims that the "[e]vidence shows that security risks from apps downloaded directly or from alternative app stores are many times larger than security risks from apps downloaded through Google Play" and that "Google's strategy also creates value by letting users with varying preferences and levels of sophistication balance security risks in different ways."<sup>637</sup> This is yet another argument that competition itself is bad, not an explanation of how Google's behavior increases competition (*i.e.*, is pro-competitive) in one of the relevant antitrust

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<sup>634</sup> Ou, Tiffany, "A Breakdown of China's Android Market," Business of Apps, July 6, 2020, <https://www.businessofapps.com/insights/a-breakdown-of-chinas-android-market/>.

<sup>635</sup> Google, "Android in China: A Parallel Universe," GOOG-PLAY-000272539.R-699.R, at 675.R.

<sup>636</sup> Bu, Lambert, et al., "The Future of Digital Innovation in China," McKinsey Digital, October 2021, available at <https://www.mckinsey.com/featured-insights/china/the-future-of-digital-innovation-in-china-megatrends-shaping-one-of-the-worlds-fastest-evolving-digital-ecosystems>.

<sup>637</sup> Gentzkow Report, ¶ 470.

markets that I have defined. First, Dr. Gentzkow appears to exaggerate the security risks and impact of devices with off-Play sources. As Dr. Qian explains, the proportion of devices with Potentially Harmful Applications (“PHAs”) installed are still at most ████% of total devices (in 2017), falling to ████% in 2020 (this compares with devices with Google Play Store only apps with PHAs increasing from ████% in 2017 to ████% in 2020).<sup>638</sup>

285. In addition, as stated in my Opening Report, Google erected these technological hurdles despite its knowledge that very few apps installed via sideloading are harmful: “[v]ery few users have ever encountered a potentially harmful app, and even fewer have actually been affected by potentially harmful apps ... this risk is miniscule.”<sup>639</sup> Google also provides no possibility of a developer “coming to Google and proving their reputation, the safety of their applications such that the user will not need to go through the unknown sources install process.”<sup>640</sup> Moreover, Google Play Protect has a built-in security system that protects a user’s device; according to Google’s guidance, “[i]f Play Protect detects a PHA, it displays a warning” and, “[f]or certain malicious apps, Play Protect automatically disables or removes the app.”<sup>641</sup> As I explained in my Opening Report, “at the time the sideloading warnings are displayed to users with phones featuring Google Play Protect, Google has enough information to determine if a sideloaded app is known to be malware, and if the app is identical to an app on Play Store.”<sup>642</sup> Dr. Gentzkow’s claim that Google’s strategy that lets users “with varying preferences and levels of sophistication balance security risks in different ways”<sup>643</sup> ignores that Google’s restrictions

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<sup>638</sup> Qian Report, Figure 6. *See also* PX2666, GOOG-PLAY-000094746, at -749, Android 10 Consumer Release Comms. Doc (Sept. 2019) (“In December 2018, only 0.082% of devices with GPP enabled that exclusively download apps from Google Play contained PHA. By comparison 0.696% of devices with GPP enabled that also sideloaded apps contained PHA during the same period.”).

<sup>639</sup> Rysman Opening Report, ¶ 436, citing to Google, “Auto scan blog post,” GOOG-PLAY-000415076-078, at 076-077.

<sup>640</sup> Deposition of David Kleidermacher, Vice President of Engineering at Google, February 3-4, 2022, p. 131.

<sup>641</sup> *See*, Google Play Protect, “Potentially Harmful Applications (PHAs),” available at: <https://developers.google.com/android/play-protect/potentially-harmful-applications>.

<sup>642</sup> Rysman Opening Report, ¶ 436.

<sup>643</sup> Gentzkow Report, ¶ 470.

actually limit users with varying preferences and levels of sophistications from making choices to balance security risks in different ways.

286. However, alternative app stores not pre-installed are still disadvantaged. Amazon notes that “Google does not make it easy for customers to download and install our Android Appstore. Customers must enable ‘Unknown Sources’ on their devices. This setting is hard to find, confusing and scary for many customers.”<sup>644</sup> Additionally, as I have discussed above at paragraph 178, the metrics Dr. Gentzkow refers to, in particular Exhibit 16 showing users engaging in direct downloading, focus on the availability of the direct download channel, not whether Android users are meaningfully using that channel as an alternative to Google Play.<sup>645</sup> Dr. Gentzkow also presents evidence (Exhibit 37) showing the proportion of devices that have at least one app with permission to download from unknown sources enabled by country, showing:

■ percent of worldwide (excluding China) devices with the Oreo or later version of the Android OS have unknown sources enabled. This percentage varies based on geographic location, with ■ percent in Japan, close to ■ percent in several countries including Bangladesh, Egypt and the Philippines, and ■ percent in other countries.<sup>646</sup>

287. Again, this statistic does not speak to whether direct downloading is a meaningful alternative to Play Store or even whether consumers have done any downloading, just whether unknown sources have been enabled. The fact that the evidence presented in my Opening Report shows direct downloading does not meaningfully compete suggests that Google’s conduct may have influenced users’ decision to not use that channel frequently enough to influence Google’s pricing.<sup>647</sup>

288. Finally, I would also note that even if, for the sake of argument, I accept Dr. Gentzkow’s claims that the challenged conduct related to security has not foreclosed access via direct downloading, then Google’s restrictive behavior might not be anticompetitive with regard

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<sup>645</sup> Gentzkow Report, ¶ 483.

<sup>646</sup> Gentzkow Report, ¶ 485.

<sup>647</sup> Rysman Opening Report, ¶¶ 151-152.

to sideloading, in which case I should not include direct downloading / sideloading in the relevant market. This would only have the effect of *increasing* Google Play Store's market share in the Android App Distribution Market in any event and would be a less conservative assumption.

3. *Dr. Gentzkow Does Not Show that Google Play Revenue Led to Investment in the Android Ecosystem*

289. Dr. Gentzkow claims that “[i]n a but-for world where the ability to earn revenue through service fees was reduced or eliminated, Google’s incentives to support the ecosystem would be weakened and users and app developers would likely suffer as a result. Google would have less incentive to take costly steps to expand the Android ecosystem and compete effectively with iOS.”<sup>648</sup> However, Dr. Gentzkow never shows that revenue from the Google Play Store service fee led to investment in the rest of the ecosystem or what the counterfactual effect would be. In fact, Google earns revenue from Android in a variety of ways, such as the Google Play Store, search advertising when consumers use Chrome (the default browser), display ads, and through YouTube. Thus, even without Google Play Store revenue, Google would still be incentivized to invest in the Android ecosystem in order to maintain and grow these revenue sources.

290. Contrary to Dr. Gentzkow’s assertion, a comparison of Google’s Android revenue (which includes Search, Google Play Store, YouTube, and Display revenue) with its Google Play Store revenue, as depicted in Exhibit 18 and Exhibit 19 below, illustrates that Google Play Store revenue, [REDACTED], both worldwide (excluding China) and in the United States during the period 2015 to 2021. Android revenue increased from [REDACTED] to [REDACTED] worldwide (excluding China) and from [REDACTED] to [REDACTED] in the United States during the period 2015 to 2021. During the same period, the Google Play Store revenue increased [REDACTED] from [REDACTED] to [REDACTED] worldwide (excluding China) and from [REDACTED] to [REDACTED] in the United States. Thus, Dr.

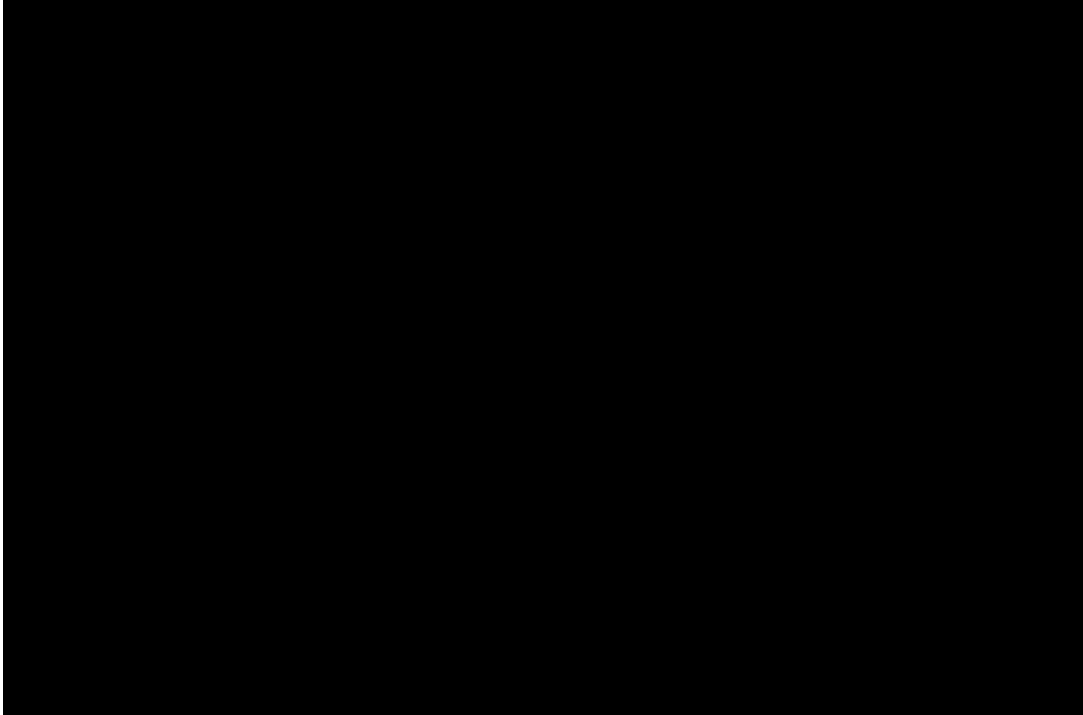
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<sup>648</sup> Gentzkow Report, ¶ 637.



Gentzkow's assertion that users and developers would suffer in a world absent Google's challenged conduct because [REDACTED] is inconsistent with Google's financials.

**Exhibit 18**  
**Google Play Store Revenue is a Small and Decreasing Share of Android Revenue Worldwide (excluding China), 2015-2021**



*Notes:*

[REDACTED]

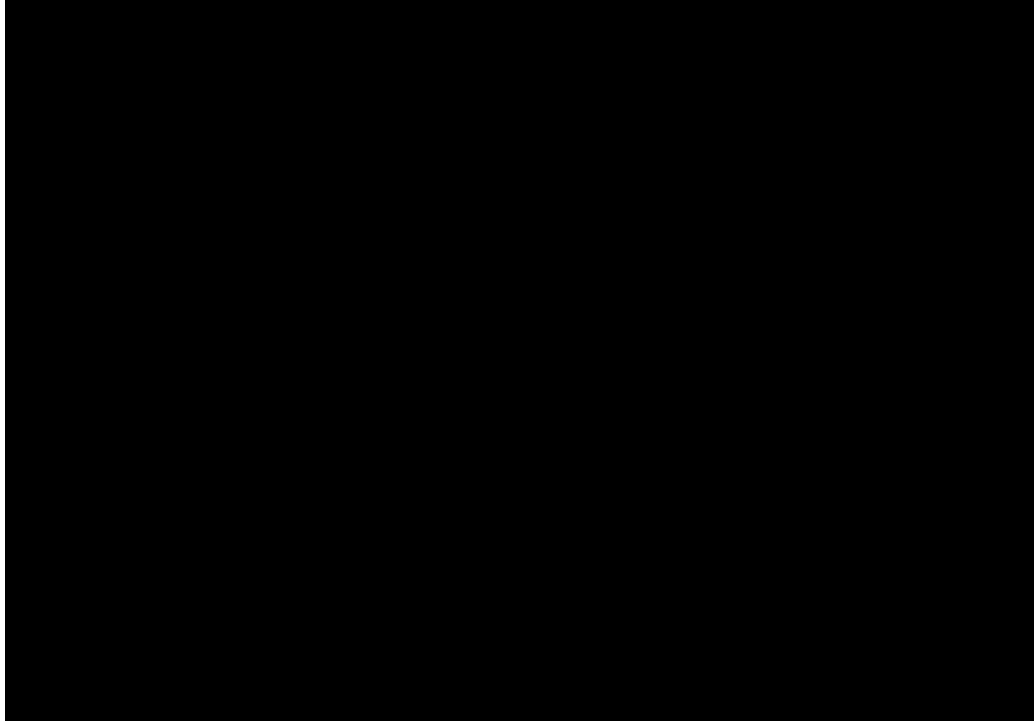
*Sources:*

1. GOOG-PLAY-003778936 at sheets "Phone Combined," "search\_revenue," "display\_revenue" (2015); GOOG-PLAY-011607543 at sheets "Phone Combined," "play\_revenue\_cost," "search\_revenue," "display\_revenue" (2016); GOOG-PLAY-011607545 at sheets "Annual Value device," "play\_revenue\_cost," "search\_revenue," "display\_revenue" (2017); GOOG-PLAY-004235367 at sheets "Annual Value device," "play\_revenue\_cost," "search\_revenue," "display\_revenue" (2018); GOOG-PLAY-005577045 at sheets "Annual Value device," "search\_revenue," "display\_revenue" (2019); GOOG-PLAY-011607542 at sheets "Annual Value device," "Ads on

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Play," "search\_revenue," "display\_revenue" (2020); and GOOG-PLAY-011607544 at sheets "Annual Value device," "Ads on Play," "search\_revenue," "display\_revenue" (2021).

**Exhibit 19**  
**Google Play Store Revenue is a Small and Decreasing Share of Android Revenue**  
**United States, 2015-2021**



*Notes:*

[REDACTED]

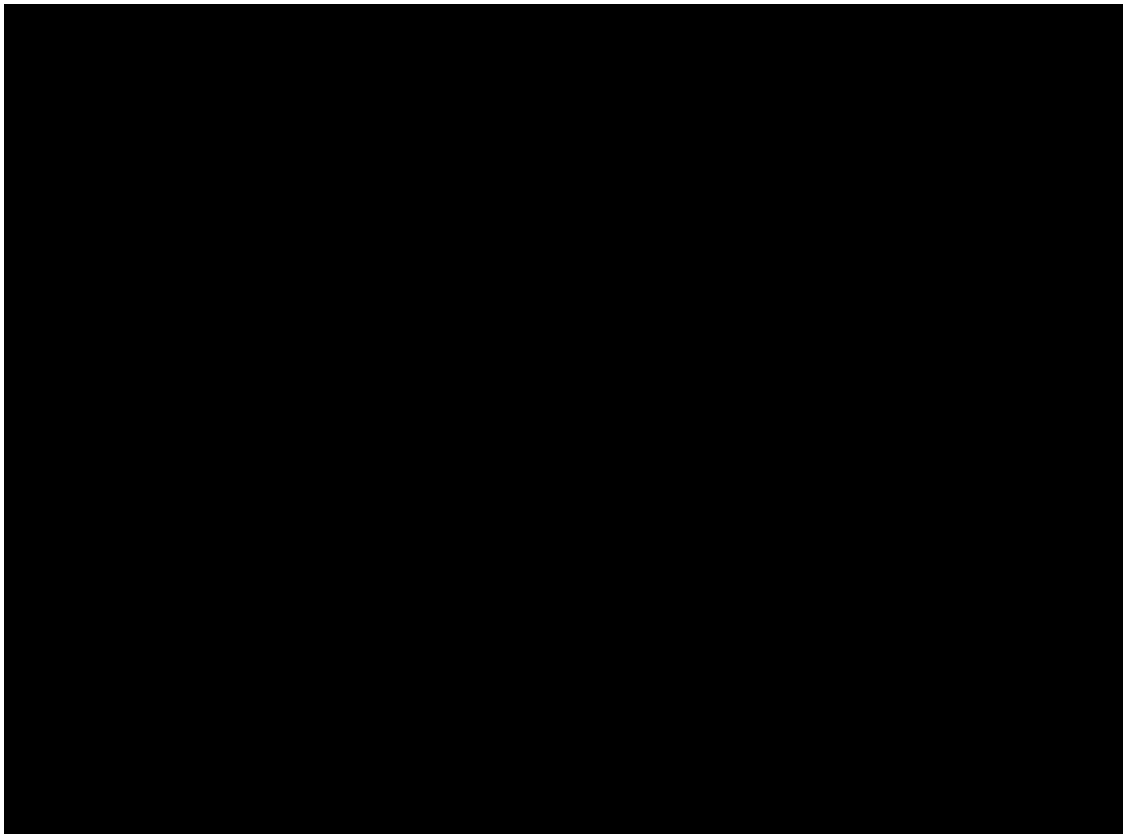
*Sources:*

1. GOOG-PLAY-003778936 at sheets "Phone Combined," "search\_revenue," "display\_revenue" (2015); GOOG-PLAY-011607543 at sheets "Phone Combined," "play\_revenue\_cost," "search\_revenue," "display\_revenue" (2016); GOOG-PLAY-011607545 at sheets "Annual Value device," "play\_revenue\_cost," "search\_revenue," "display\_revenue" (2017); GOOG-PLAY-004235367 at sheets "Annual Value device," "play\_revenue\_cost," "search\_revenue," "display\_revenue" (2018); GOOG-PLAY-005577045 at sheets "Annual Value device," "search\_revenue," "display\_revenue" (2019); GOOG-PLAY-011607542 at sheets "Annual Value device," "Ads on Play," "search\_revenue," "display\_revenue" (2020); and GOOG-PLAY-011607544 at sheets "Annual Value device," "Ads on Play," "search\_revenue," "display\_revenue" (2021).

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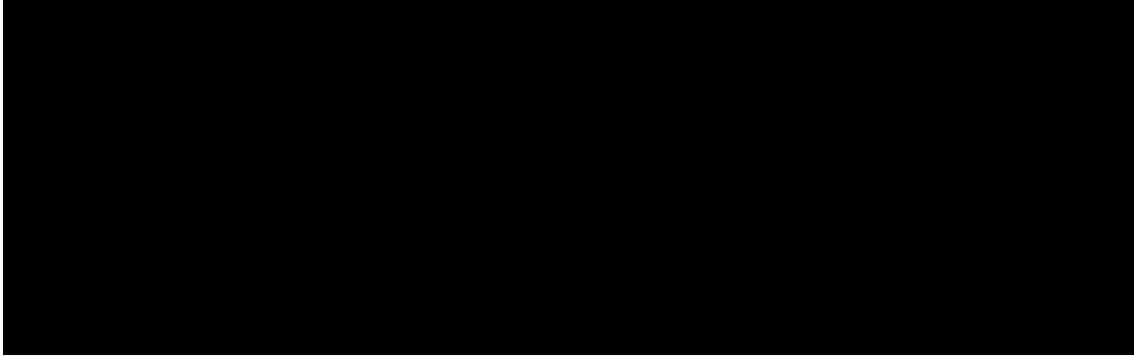
291. Investment is inherently forward-looking so, to the extent that Google could predict the falling revenue share of the Google Play Store, it would have become less important in driving investment well before the lower shares arrived. Additionally, the Android revenue does not include revenue from other sources that presumably benefit from a strong Android product, such as sales of the Google Pixel phone and Watch (not to mention any data harvesting that Google is able to exploit through sales of Android products). Thus, it is entirely plausible that Google would continue to invest in the Android operating system even with a lower level of Google Play Store revenue. Dr. Gentzkow fails to establish that Google Play Store revenue led to investment by Google in Android. Moreover, as noted in Section IV.B.4 above, and as presented in Exhibit 20 below, R&D expenses are [REDACTED] Android revenue, [REDACTED], thereby undermining Dr. Gentzkow's claim that Google needed Google Play Store revenues to invest in the Android ecosystem.

**Exhibit 20**  
**R&D Expenses as a proportion of Android Revenue, 2015-2021**





**Exhibit 21**  
**Google Play Store Revenues are a Small Fraction of Google Revenues**



*Notes:*

1. Alphabet Inc. and Google Inc. make changes to the reporting of their revenues over time. Where available, the revenues listed here reflect revenues reported for the “Google segment” of Alphabet Inc.’s total revenues as a conservative estimate of Google’s revenues. Some revenue streams that may come from Google, such as “Google Cloud,” are excluded from this segment in 2020 and 2021.
2. Worldwide Play Revenue includes China, in order to be more directly applicable to the total revenue from Google’s financial statements, which include China.

*Sources:*

1. Alphabet Inc., “10-K,” February 11, 2016, available at <https://www.sec.gov/Archives/edgar/data/1288776/000165204416000012/goog10-k2015.htm>.
2. Alphabet Inc., “10-K,” February 3, 2017, available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204417000008/goog10-kq42016.htm>.
3. Alphabet Inc., “10-K,” February 6, 2018, available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204418000007/goog10-kq42017.htm>.
4. Alphabet Inc., “10-K,” February 5, 2019, available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204419000004/goog10-kq42018.htm>.
5. Alphabet Inc., “10-K,” February 4, 2020, available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204420000008/goog10-k2019.htm>.
6. Alphabet Inc., “10-K,” February 3, 2021, available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204421000010/goog-20201231.htm>.
7. Alphabet Inc., “10-K,” February 2, 2022, available at <https://www.sec.gov/Archives/edgar/data/1652044/000165204422000019/goog-20211231.htm>.
8. See Exhibit 19 sources.

4. *Dr. Gentzkow does not Show that Foreclosure Provided a Better ‘Out-of-the-Box’ Experience*

293. Dr. Gentzkow’s fourth challenge is that “Google must use contracts to align the incentives of these partners to deliver the kind of out-of-the-box experience that can compete successfully with iOS and strengthen Android’s brand,” where an “out-of-the-box experience

requires that the device includes core apps that users expect including a safe, easy, and reliable way to get new apps.”<sup>649</sup> He makes several unsupported assertions such as “OEM or MNO might benefit from omitting key apps, installing less relevant or lower-quality apps or app stores, or placing apps in a less user-friendly position,” or that “[t]he OEM or MNO might have incentives to do so even if it worsens the user’s experience—for example, because the OEM or MNO earns revenues from installation or use of these other apps or app stores.”<sup>650</sup>

294. However, Dr. Gentzkow does not explain why Samsung’s (or other OEMs’) incentives are not aligned to deliver a high-quality ‘out-of-the-box’ experience for their customers. Without their own operating systems, Samsung and other Android smart mobile device OEMs rely heavily on Android and the user experience their consumers receive when using their devices. Absent Google’s conduct, Samsung and other device makers still have a strong incentive to give users what they want and expect, including a high-quality “out-of-the-box” experience.

295. Furthermore, if OEMs have a revenue incentive that could lead them to make app choices that lessen the consumer experience, then Google has a revenue incentive to promote its own app store to the detriment of consumer benefits. Because competitive markets tend to dampen the ability of firms to make decisions that hurt consumers and because OEMs exist in a less concentrated market than Google’s Android OS, it follows that the likelihood of Google taking such actions is higher. Additionally, Dr. Gentzkow does not show or even claim that consumers prefer having fewer app stores to more. If consumers want a smartphone with a single app store, they have a competitive option: the Google Pixel series of smartphones.<sup>651</sup> However,

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<sup>649</sup> Gentzkow Report, ¶ 130.

<sup>650</sup> Gentzkow Report, ¶ 130.

<sup>651</sup> Goodwin, Richard, “Which Android Phone Has the Least Bloatware? Let’s Find Out...,” December 16, 2020, available at <https://www.knowyourmobile.com/user-guides/which-android-phone-has-the-least-bloatware-lets-find-out/> (“Each Android manufacturer has its own custom Android skin, a UX that sits on top of the Android software

the Google Pixel has a substantially smaller market share than Samsung, or other brands of Android smart mobile devices with more than one app store preinstalled. During the period 2016-2021, Google's share of Android smartphone device sales worldwide (excluding China) was less than 1%, as depicted in Exhibit 22 below; by contrast, Samsung's share was 32% to 36% during the same period.<sup>652</sup>

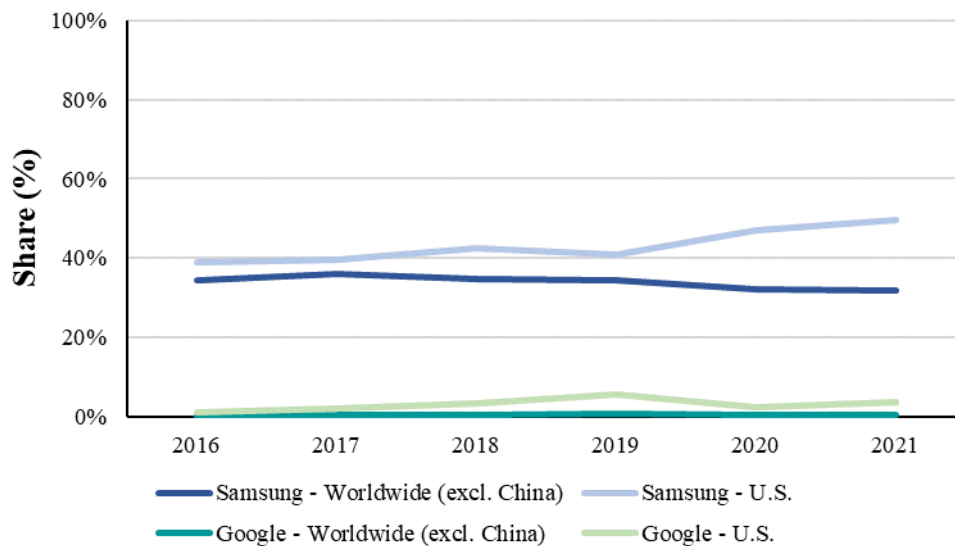
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and, in most cases, adds in features and abilities unique to that brand... Google's Android partners have gotten pretty good at creating good-looking, highly useful custom skins... When it comes to Android phones with no bloatware, you have a select few options. If you want a true Android experience, one with ZERO bloatware and Android running as Google intended, get a Pixel phone. ... If you want stock Android, meaning Android as it runs on Google's Pixel phones, but you don't want to buy a Pixel phone, the next best option would be one of Nokia's Android phones.") I interpret this to mean that Pixel phones offer the "clean, consistent, and high-quality 'out-of-the-box' experience" in the sense that Dr. Gentzkow implies.

<sup>652</sup> Similarly, Google's share of Android smartphone device sales in the United States during the period 2016-2021 peaked at 6% in 2019 while Samsung's share in the U.S. during the same period ranged from 39% to 49%. See Rysman Rebuttal Report Workpapers.



**Exhibit 22**  
**Google Smartphones have Minimal Share of Android Smart Mobile Device Sales, 2016-2021**



*Note: Shares are calculated on the basis of Android smartphone units sold.*

*Source: Appendix D.*

296. While there may be multiple explanations for why Google has a lower market share than Samsung (or others), it is worth noting that the Pixel line of phones does very well on review websites. Wirecutter.com named the Pixel 7 it's top pick for Android phones in November 2022<sup>653</sup> and CNET gave the Pixel 6 an Editor's Choice Award for 2021.<sup>654</sup> Earlier generations of Google's Pixel phone also reviewed well.<sup>655</sup> These review articles do not mention the lack of OEM software as a positive (or negative) feature of the Google Pixel phones, suggesting that the relative benefit of Google's 'out-of-the-box' experience is of limited value. To the extent that Dr. Gentzkow is using Google's need to control OEM placement of

<sup>653</sup> Whitwam, Ryan, "The 5 Best Android Phones," *The New York Times*, November 16, 2022, available at <https://www.nytimes.com/wirecutter/reviews/best-android-phone/>.

<sup>654</sup> Holland, Patrick, "Google Pixel 6 review: This phone is everything I wanted," *CNET*, November 20, 2021, available at <https://www.cnet.com/tech/mobile/google-pixel-6-review/>.

<sup>655</sup> La, Lynn, "Google Pixel review: Pure Android at its absolute best," *CNET*, October 18, 2016, available at <https://www.cnet.com/reviews/google-pixel-review/> ("The Google Pixel remains our favorite phone, bar none -- unless you're looking for a bigger screen, in which case we'd recommend its big brother, the Pixel XL.").

OEM app stores as an explanation for otherwise anticompetitive behavior, the evidence I present here suggests it is unjustified.

## **H. Dr. Gentzkow's Critiques Related to Android In-App Billing Services are Flawed**

### *1. Dr. Gentzkow's Claim that I Misinterpret Google's Service Fee is Incorrect*

297. Dr. Gentzkow claims "Plaintiffs' experts incorrectly interpret Google's service fee as a price Google charges for the use of the billing system alone."<sup>656</sup> However, Dr. Gentzkow's characterization is incorrect. As I explained in my Opening Report, in-app billing services, including Google Play Billing, are a bundle of complementary services, which includes receiving payment and authorizing the unlocking of the purchased in-app content through tokenization and may also include invoicing, payment history, refund processing, and subscription management.<sup>657</sup> I demonstrated that this bundle of services, which includes payment processing as one element, is a separate product from Android app distribution, for which developers have separate demand, and developers have alternatives to Google Play Billing, including providing the bundles of services themselves.<sup>658</sup>

298. Dr. Gentzkow further claims that I incorrectly "directly compare[] Google's historic 30 percent service fee to the fees charged by third-party payment processors such as PayPal, Stripe, Braintree, and Adyen."<sup>659</sup> While I point out the transaction fees charged by various alternative billing service providers, which often charge a two-part commission with a percentage fee in the range of 2% to 3% and a fixed dollar amount per transaction of \$0.12 to \$0.49 as a point of comparison,<sup>660</sup> I did not use these rates as a but-for competitive commission rate. Instead, I used the 15% commission rate Google offered certain developers as the but-for competitive commission rate that would apply to all developers and launch sooner than it did in

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<sup>656</sup> Gentzkow Report, ¶ 544.

<sup>657</sup> Rysman Opening Report, ¶ 238.

<sup>658</sup> Rysman Opening Report, § V.D.2.

<sup>659</sup> Gentzkow Report, ¶ 544.

<sup>660</sup> Rysman Opening Report, ¶ 55 and Exhibit 8.

the actual world. Dr. Gentzkow ignores the fact that my but-for commission rate is not based on the fees charged by these various third-party payment processors, but instead on Google's own rates.<sup>661</sup>

2. *Dr. Gentzkow's Characterization of the But-For World for In-App Billing Services Contains Logical Flaws*

299. Dr. Gentzkow also claims "[t]he second error made by Plaintiffs' experts is that their analyses of the impact of the billing system requirement do not allow for the possibility that Google would continue to set a positive service fee for transactions using alternative billing systems in the but-for world. In fact, their market definitions and economic frameworks implicitly (and wrongly) assume but-for worlds in which Google cannot set such a fee."<sup>662</sup>

300. He contends that "[t]he relevant but-for world is one where the billing system requirement is absent, but Google retains the ability to set and enforce its service fee for in-app transactions including transactions processed through non-Google billing systems"<sup>663</sup> and thus concludes, "[t]he correct point of comparison is the price Google charges for Google Play's billing system when it is offered separately from the services of Google Play—*i.e.*, the incremental service fee for Google Play in-app transactions involving Google Play's Billing system relative to those involving alternative billing systems."<sup>664</sup> He claims that Google could separate out one element of the bundle of services, allowing developers to obtain that service separately, and continue to charge developers for the remaining bundle of in-app billing services, as it purportedly did in South Korea following regulatory changes and elsewhere under its user choice billing pilot, as I explained in my Opening Report.<sup>665,666</sup>

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<sup>661</sup> Rysman Opening Report, § VII.B.2.

<sup>662</sup> Gentzkow Report, ¶ 550.

<sup>663</sup> Gentzkow Report, ¶ 553.

<sup>664</sup> Gentzkow Report, ¶ 548.

<sup>665</sup> Gentzkow Report, ¶ 548.

<sup>666</sup> Rysman Opening Report, ¶¶ 75, 262, 532 and footnote 249.

301. A but-for world is one in which a defendant does not engage in the particular challenged conduct. The challenged conduct at issue in the Android In-App Billing Services Market is tying the use of Google Play Billing (tied product) to Android app distribution (tying product). As noted in my Opening Report,<sup>667</sup> and as Dr. Gentzkow agrees,<sup>668</sup> Google Play Billing is a bundle of services, which includes payment processing as well as tokenization, hosting, refunds, etc. In my but-for world, developers could choose an alternative in-app billing services provider for these services, and Google, subject to this competition, would offer a reduced commission rate in order to compete.

302. Further, that Google is able to unbundle one element of the Google Play Billing bundle of services and continue to charge developers for the remaining elements of the bundle does not reflect a but-for world in which there is competition in the In-App Billing Services Market. As I explained in my Opening Report, the but-for service fee would be at most 15%.<sup>669</sup> Absent Google's challenged conduct, in unbundling the payment processing piece of the in-app billing services bundle, the amount Google claims it charges for one part of the bundle of services would be deducted from the but-for commission (*i.e.*, 15%), not the commission in the actual world in which Google's commission reflects its monopoly power.

### 3. *Dr. Gentzkow's Interpretation of Developers' Demand for Alternative Billing Systems is Incorrect*

303. Dr. Gentzkow claims that "Plaintiffs' experts ... mistake evidence that some developers wish to evade Google's service fee for evidence that developers have positive demand for alternative billing systems."<sup>670</sup> This statement is incorrect. The very fact that developers will seek other channels for Android In-App Billing Services is evidence they have demand for Android In-App Billing Services separate from their demand for Android App

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<sup>667</sup> Rysman Opening Report, § VIII.A.2.

<sup>668</sup> Gentzkow Report, ¶ 523.

<sup>669</sup> Rysman Opening Report, ¶ 474.

<sup>670</sup> Gentzkow Report, ¶ 558.

Distribution. Developers need in-app billing services. Evidence that they would like to obtain these services from providers other than Google is evidence of separate demand.

304. Dr. Gentzkow also states Google’s commission rates “ha[ve] since fallen for most developers, and the overwhelming majority of developers who do pay service fees are now eligible to pay 15 percent (see Exhibit 6) on all their revenue.”<sup>671</sup> However, this graphic is misleading. First, it considers only U.S. developers, yet worldwide developers produce apps downloaded from the Google Play Store by Android users worldwide (excluding China). Further, the average commission rate on Google Play Store transactions remains very close to 30%. As set out in Exhibit 35 of my Opening Report, the average commission in 2021 was 29.6% while the average commission during the period 2012-2020 was 30%. This suggests that while some developers may pay a commission lower than 30%, the vast majority of spending on the Google Play Store attracts the highest rate of commission (30%). Moreover, as Exhibit 14 above demonstrates, the vast majority of new apps published in the Google Play Store still pay 30%. By focusing on the number of developers that pay 15% rather than the amount of revenue derived from developers that pay a 15% commission, Dr. Gentzkow is emphasizing the many small “one-off” developers who have little activity on the Play Store. But Google’s pricing and revenue is better characterized by the revenue that Google’s fees apply to, not the number of developers.

4. *Dr. Gentzkow Fails to Demonstrate that Google did not Tie Google Play Billing to Distribution on Google Play*

305. Dr. Gentzkow claims “app developers are not coerced into using Google Play’s billing system as a condition of distributing their apps through Google Play,” and that “[a]pp developers who use Google Play may monetize through means such as advertising that are not subject to the billing system requirement and may also collect payments for digital goods and services through other platforms or channels outside Google Play.”<sup>672</sup> First, while developers

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<sup>671</sup> Gentzkow Report, ¶ 520.

<sup>672</sup> Gentzkow Report, ¶ 46.

may *choose* to monetize through advertising in lieu of being “coerced into using Google Play’s billing system as a condition of distributing their apps through Google Play,” it is in fact true that Google requires app developers who monetize through paid in-app content to use Google Play Billing for apps distributed through the Google Play Store.<sup>673</sup> App developers who choose to monetize through paid in-app content, and not through advertising, in a world in which Google imposes a supracompetitive fee, demonstrate a preference for monetizing through paid in-app content. Choosing this monetization strategy does not mean that the commission rate they pay is not supracompetitive. Furthermore, Google controls remuneration through advertising as well as paid content, so it is not as if advertising on the Google Play Store represents a competitive alternative.

306. Empirical evidence on app monetization strategies rejects Dr. Gentzkow’s claim that app developers often change their reliance on different monetization strategies. Using Google’s monthly app and ad revenue data, I demonstrate that app developers typically choose to monetize through paid in-app content *or* advertising. Exhibit 3 in Section 112 depicts the share of apps that choose to monetize through either a single strategy (either paid in-app content or advertising), compared to apps using both monetization strategies, showing that [REDACTED]. Exhibit 4 also shows that at most [REDACTED]% of apps switch their strategy. Explanations may be that particular monetization strategies are appropriate for different types of apps or that developers incur costs, such as reprogramming and designing an interface, that maximize revenue under a new monetization scheme.

307. Dr. Gentzkow appears to overlook the implication of the evidence he cites. For example, though he acknowledges that Google introduced in-app billing in March 2011,<sup>674</sup> Dr. Gentzkow fails to recognize that the introduction of Google Play Billing years after the launch of Android Market demonstrates product separateness because, before March 2011, Google did not

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<sup>673</sup> Google Play, “In-app Products,” available at <https://play.google.com/console/about/in-appproductssetup/> (“Developers who distribute their app through Google Play are required to use Google Play’s billing system to sell digital goods or services in your app”).

<sup>674</sup> Gentzkow Report, ¶ 80.

have its own in-app billing services to offer.<sup>675</sup> Dr. Gentzkow overlooks both the apps that self-supplied in-app billing services while still being available on Google Play Store and the apps Google identified as using Google Play Billing that were not distributed through the Google Play Store. All of this demonstrates separate demand for separate products.

## **VI. Dr. Leonard's Damages Criticism Suffers from Numerous Flaws**

### **A. Overview**

308. In my Opening Report, I presented a damages model to quantify the harm to U.S. consumers from Google's challenged conduct.<sup>676</sup> Dr. Leonard presents a number of criticisms of my model to support his claim that my model is "flawed." I have considered Dr. Leonard's criticisms, which, as I explain below, lack merit. He misunderstands, misrepresents, and mischaracterizes much of my work and overlooks important factors demonstrating that my damages model results in a conservative estimate of damages.

309. Moreover, Dr. Leonard's own damages model does not correctly account for his theoretical claims about pass-through.<sup>677</sup> It would therefore be a mistake to rely on Dr. Leonard's estimate of the pass-through rate in my calculations.

310. In addition, Dr. Leonard's damages quantifications completely ignore any effect of Google's anticompetitive conduct on consumers through variety, and he does not even attempt to propose a "corrected" version of my variety damages quantification.<sup>678</sup> I conclude, therefore,

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<sup>675</sup> Rysman Opening Report, ¶ 73; <https://android-developers.googleblog.com/2011/03/in-app-billing-launched-on-android.html>.

<sup>676</sup> Rysman Opening Report, § IX.D.

<sup>677</sup> See Section VI.C.

<sup>678</sup> Interestingly, Dr. Leonard does not question that economics provides tools to quantify benefits of variety to consumers. Note that in his 2002 paper, Dr. Leonard studies the variety effect of an introduction of a new product in the bath tissue market. He uses economic tools similar to what I use to evaluate welfare effects of new varieties (although, not identical as his market and the settings are different. For example, he evaluates welfare effect of introducing one product.). He states that "[t]he continuous development and introduction of new products is an important source of improvement in consumer welfare." See Hausman, Jerry A. and Gregory K. Leonard, "The Competitive Effects of a New Product Introduction: A Case Study," *The Journal of Industrial Economics*, vol. 50, no. 3, 2002, pp. 237–63.



that Dr. Leonard's criticisms do not change my opinion on damages resulting from Google's challenged conduct. I explain these issues in further detail in the sections that follow.

**B. Dr. Leonard Misrepresents My Work on But-For Service Fee Benchmarking**

311. Dr. Leonard criticizes my method of benchmarking for the but-for world commission. He states that the only rationale for 15% on Android App Distribution that I put forward is that, under certain circumstances, Google offered similar rates to some developers and that in the but-for world there would be even more competition than under those circumstances. Dr. Leonard also criticizes me for not justifying uniform commissions "across all transactions, all developers, and the entire alleged damages period" in the but-for world.<sup>679</sup>

312. This is a misrepresentation of the rationale behind my 15% upper bound on the but-for world commission. As I explain in my Opening Report, in the but-for world in which Google does not pursue anticompetitive behavior, I take 15% as an upper bound on the commission based on the following: (i) Google's ability to profitably charge a 15% commission to certain developers; (ii) Google itself identifying 4 programs, LRAP, LRAP++, ADAP, and SwG, in response to an interrogatory asking about commission agreements with developers and the maximum commission offered by these programs being 15%; and (iii) the fact that in the competitive but-for world Google would have, by definition, faced yet more pressure on the level of commissions.<sup>680</sup>

313. This conservative upper bound on the but-for rate applies both to initial downloads and purchase of in-app content. With a few exceptions, Google sets the same commissions on both kinds of transactions in the actual world.<sup>681</sup> As for the uniform commission, I have not argued that the commission would be uniform across all transactions, all developers, and the entire alleged damages period. I have argued that 15% is a conservative

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<sup>679</sup> Leonard Report, ¶ 120.

<sup>680</sup> Rysman Opening Report, ¶¶ 535-537.

<sup>681</sup> Rysman Opening Report, ¶ 474-475.

estimate of the but-for commission but this does not imply a uniform commission. In the but-for world that I posit, Google's effective commission could vary, but would be at or below 15%.

314. Dr. Leonard also misrepresents my benchmarking analyses for the but-for commission by claiming that I use other app stores' rates as benchmarks.<sup>682</sup>

315. This is not what I have done. I have not used other app stores as benchmarks. I have used Google's own commission discounts as benchmarks. The information about commissions on other platforms that I lay out in my Opening Report serves as corroborating evidence rather than being the primary benchmarks on which I base my but-for commission. Dr. Leonard agrees with me that Google's own commission rates can serve as a benchmark for determining the competitive but-for commission rate. Indeed, to estimate Google's but-for commission, Dr. Leonard himself relies on Google's 15% commission on all subscriptions starting January 1, 2022 and Google's commission discount of 15% for the first \$1 million of each developer's annual gross revenue. He also admits that "[w]ith Google Play serving as a benchmark for itself, economic similarity of the benchmark to the target is ensured."<sup>683</sup>

316. Although Dr. Leonard agrees that Google's own commissions should be used as a benchmark, his method of estimating but-for commission is flawed. He assumes that the actual commission fee structure in 2022 would have been adopted in the but-for world from an earlier point in time.<sup>684</sup> This implicitly assumes that Google does not currently have market power and its current commissions are competitive.<sup>685</sup> However, other than subscriptions, developers currently mostly enjoy lower commission only on the first \$1 million of their annual gross revenue. As I have explained in my Opening Report, in the competitive but-for world, competitive pressure on Google would be what Google has faced so far in the actual world plus

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<sup>682</sup> Leonard Report, § IX.

<sup>683</sup> Leonard Report, ¶ 178.

<sup>684</sup> Leonard Report, ¶ 178.

<sup>685</sup> Dr. Leonard's but-for rates would be appropriate if Google used to have market power but now it does not. However, Dr. Leonard does not make that case. He states that "I note that competitive pressure may exist even if there are no actual competitors in the relevant market," but does not argue that currently Google does not have market power. *See* Leonard Report, footnote 246.

additional pressure due to enhanced competition.<sup>686</sup> Many developers would become more price sensitive as they would have more alternatives from which to choose and switch if desired. Developers would have an increased ability to find a substitute to Google Play or its billing system, and according to the evidence discussed in my Opening Report, this would discipline Google's price setting power and hence its commission.<sup>687</sup>

317. Finally, Dr. Leonard notes that my "15% but-for service fee rate is inconsistent with Dr. Singer's but-for service fee (23.4%) based on the Singer combined market take rate model. Dr. Rysman's overcharge damages calculation would be reduced by over half if he were to use Dr. Singer's 23.4% but-for service fee rate."<sup>688</sup> Dr. Singer estimates 23.4% as an alternative scenario "[i]n the event that the factfinder concludes that the Android App Distribution Market and In-App Aftermarket are not two separate markets..."<sup>689</sup> Hence, his results are not directly comparable to mine as I do not consider a scenario in which Android App Distribution Market and In-App Aftermarket are the same market, having determined that each is a well-defined relevant antitrust market. In other words, this is not an apples-to-apples comparison of the results arrived at by me and Dr. Singer.<sup>690</sup>

### **C. Dr. Leonard's Pass-Through and Developer Marginal Cost Criticisms Are Irrelevant**

318. A large part of Dr. Leonard's criticism is devoted to the pass-through rate. In economics, in some common pass-through analyses, one would study the effect of marginal cost

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<sup>686</sup> Rysman Opening Report, ¶ 473.

<sup>687</sup> Rysman Opening Report, ¶ 472.

<sup>688</sup> Leonard Report, ¶ 121.

<sup>689</sup> Singer Merits Report, p.132.

<sup>690</sup> For the sake of comparison, I run my damages model and estimate welfare effects under the assumption of 23.4% but-for commission. *See* results in Rysman Rebuttal Report Backup Production.

on price or the effect of ad valorem tax (fee) on price.<sup>691</sup> One would study how changes in marginal cost (or ad valorem fee) are passed through to price, and thus to consumers. However, what Dr. Leonard refers to as pass-through in my model is actually the ratio of a change in the app's price to the change in the amount paid to Google in commission. The amount paid to Google equals the price the app charges times the commission rate. Using this definition of pass-through, Dr. Leonard emphasizes that the pass-through rate under a version of the CES model is unparameterized. However, he does not acknowledge that the effect of the commission rate on the price in the CES model depends on the elasticity, as it should. In what follows, I use pass-through to refer to the same object as Dr. Leonard (the equilibrium relationship between the change in price and the change in the amount paid to Google) for clarity.

319. Dr. Leonard claims that my “overcharge damages calculations” are “flawed” because I have assumed a “100% service fee pass-through rate.”<sup>692</sup> However, Dr. Leonard misrepresents my model. There is no place in my report where I state that the pass-through rate of service fees is 100%. My report takes no position on the pass-through rate. I focus on results with a 100% pass-through rate in my SSNIP test to be conservative and a 0% pass-through rate in my damages calculation to be conservative. My approach to the SSNIP is conservative because the more apps pass through the hypothetical monopolist's commission increase, the more that total quantity decreases and the less likely the requirements of the SSNIP are satisfied. Similarly, I consider damages estimates for 0% and 100% pass-through rates (“Variety Effects” and “Total Damages” versions in my Opening Report) and show that 0% presents the lower damages estimate between the two, which I chose as my damages estimate to be conservative. The fact that 0% would be conservative is intuitive: when the commission rate goes from 30% to

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<sup>691</sup> Jaffe, Sonia and E. Glen Weyl. “The First-Order Approach to Merger Analysis.” *American Economic Journal: Microeconomics*, Vol. 5, No. 4, 2013, pp. 188–218, at 204–205; Bulow, Jeremy I. and Paul Pfleiderer, “A Note on the Effect of Cost Changes on Prices,” *Journal of Political Economy*, Vol. 91, No. 1, 1983, pp. 182–185. Dr. Leonard also agrees that “[t]he economics literature has extensively studied marginal cost pass-through.” See Leonard Report, ¶ 31. For a study of the effect of ad valorem tax on price see e.g., Anderson, Simon P., André de Palma, and Brent Kreider, “Tax Incidence in Differentiated Product Oligopoly,” *Journal of Public Economics*, Vol. 81, No. 2, 2001, pp. 173–192. Dr. Leonard also discusses ad valorem fee which is Google's commission rate. See Leonard Report, ¶ 32.

<sup>692</sup> Leonard Report, ¶¶ 122, 125.

15%, consumers benefit most if there is both a price effect and a variety effect. With 0% pass-through, there is only a variety effect, which is larger than with pass-through, but not enough to offset the price effect.<sup>693</sup> Thus, a 0% pass-through provides a conservative bound on damages.

320. Thus, because my model is flexible and can accommodate any pass-through rate, my approach is to make conservative assumptions rather than to attempt to determine the actual pass-through rate. It is straightforward to recalculate the SSNIP test and damages model under the proposed pass-through rates of other experts and I do so in this report.

321. Dr. Leonard presents several mechanisms that he claims could lead to low pass-through rates. If I had wanted to evaluate pass-through rates, I would have developed a model with mechanisms to address pass-through. Indeed, it is standard in economic modeling to strip out any features of the model that are not necessary to achieve the goals of the model. Because I did not use my model to evaluate pass-through but rather imposed conservative assumptions about pass-through, I did not include modeling features about pass-through.

322. Interestingly, Dr. Leonard's proposed mechanisms for why observed pass-through should be low<sup>694</sup> show that his estimated pass-through rates are not appropriate to incorporate into the SSNIP test and damages analysis.

323. First, Dr. Leonard argues that focal point pricing might lead to low pass-through rates of the commission. But Dr. Leonard's argument is misguided. Focal point pricing refers to the fact that apps tend to be priced at values that end in 0.99 or .9. Dr. Leonard's argument is that even if, absent focal point pricing, small commission changes would lead to small price changes, focal point pricing will imply that when the commission rate changes, apps will not want to make the jump to the next price level and so we will observe low pass-through.<sup>695</sup> However, this is not correct. While I have not analyzed whether this market is characterized by focal point

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<sup>693</sup> See Rysman Opening Report, footnote 1137 where I explain the intuition for why the variety effect when firms do not adjust prices to commission changes would be larger than the variety effect when firms adjust prices in response to commission changes.

<sup>694</sup> Leonard Report, ¶ 31.

<sup>695</sup> Leonard Report, ¶ 31-32.

pricing, even assuming focal point pricing, some firms would be on the margin between choosing the lower price and the higher price. In response to a change in the commission rate, they may make the jump to a different focal point price level. Thus, while some firms would not change price in response to a change in the commission rate, some firms would make much larger price changes than we would see absent focal point pricing. The overall effect is that focal point pricing could lead to larger or smaller pass-through rates than without focal point pricing. Dr. Leonard's failure to understand the implications of focal point pricing calls into question his analysis of pass-through.

324. For example, suppose there are 2 apps – both charging \$2 and each selling one item. Suppose there is a restriction that allows them to charge only prices that are whole dollars (e.g., \$1, \$2, \$3, etc.). Suppose that, after the commission decreases, the profit maximizing price for one app is \$1.9 and for the other app it is \$1.3. The first app is unlikely to drop price to \$1 from its actual price as the profit maximizing price is closer to \$2 than it is to \$1. The reverse is likely for the other app. So, the average price would likely be  $(\$1.9 + \$1.3)/2 = \$1.6$  if there were no requirement to change prices that are whole dollars. However, under the restriction, the average price would be even lower:  $(\$2 + \$1)/2 = \$1.5$ . Then, assuming the commission dropped from 30% to 15%, the pass-through of commission with respect to the average price in the first case would be:  $(\$1.6 - \$2)/(0.15 * \$1.6 - 0.3 * \$2) = \$1.11$  and the pass-through in the latter case would be:  $(\$1.5 - \$2)/(0.15 * \$1.5 - 0.3 * \$2) = \$1.33$ . Hence, the restriction would imply higher pass-through.

325. Dr. Leonard's second explanation for low pass-through rates is that developers may face frictions to changing price, such as a fixed cost that a developer must pay to change a price.<sup>696</sup> Economists sometimes refer to the cost of changing price as a menu cost, which is meant to refer to the cost to a restaurant of printing new menus each time it changes a price.<sup>697</sup> Economic models often predict that firms should adjust price immediately in response to any

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<sup>696</sup> Leonard Report, ¶ 31.

<sup>697</sup> Golosov, Mikhail, and Robert E. Lucas Jr., "Menu Costs and Phillips Curves," *Journal of Political Economy*, Vol. 115, No. 2, 2007, pp. 171–199; Kenton, Will, "What Are Menu Costs? Definition, How They Work, and Example," Investopedia, October 28, 2021, available at <https://www.investopedia.com/terms/m/menu-costs.asp>.

change in demand or marginal cost, and menu costs provide an explanation for why price changes may be less frequent.

326. It is not clear that menu costs should play a role in a SSNIP test or damages analysis. The kind of frictions that Dr. Leonard points out would be relevant once the initial price had already been set and a developer needs to decide whether to change that price. That is, those frictions would cause price stickiness in the sense that a developer would find it difficult or costly to *change* prices. However, in a sensible but-for world, Google would have set lower rates throughout the at-issue time period so app developers may have chosen lower prices from the start. The computation of damages is meant to reflect a counterfactual world in which Google charges lower rates for the entire time period at issue, not a world in which Google started with a monopoly commission rate and then changed to a competitive one. To the extent that menu costs should not be accounted for in damages calculations, the pass-through rates that Dr. Leonard proposes, which he states reflect menu costs, should not be applied to the damages calculation. Ultimately, my proposed level of damages is robust to different pass-through rates, so the determination of this issue is not critical to my analysis.

327. With regard to the SSNIP test, for instance, it would never be profitable for a firm with high enough menu costs to raise its price from the competitive level (or indeed, from any level). Thus, if we accounted for menu costs in a SSNIP test, even a set of products that faced no substitutes and were protected by high barriers to entry would not be found to be a relevant market just because of the existence of the menu costs. But that runs counter to the goals of the test. Thus, we should think about the SSNIP test from the ex-ante perspective (*i.e.* hypothetical monopolist and developers setting initial prices rather than changing prices).

328. Thus, to the extent the menu costs should not be accounted for in damages and SSNIP calculations, the pass-through rates that Dr. Leonard proposes, which he states reflect menu costs, should not be applied to these calculations. I provide calculations of both the SSNIP and welfare effects using his proposed pass-through rates, but I do so for the sake of completeness, not because I endorse his approach. Given that calculating pass-through rates that are appropriate for a SSNIP or damages calculation is challenging, I prefer my approach of using a conservative pass-through rate of 0% for damages and 100% for the SSNIP. In addition, for the sake of comparison, I also conduct the SSNIP test and welfare effects calculations using Dr.



Singer's pass-through estimate. They show that calculating welfare effects using a 0% pass-through rate (variety effects) that I have proposed in my Opening Report is the most conservative version.<sup>698</sup>

329. Dr. Leonard points out that, in the context of apps, one could also end up with a negative pass-through if one thinks about a developer's trade-offs when considering an ad-supported revenue model that developers can use as an alternative to the paid model (paid download, subscription, or other IAP).<sup>699</sup> However, Dr. Leonard does not measure substitution between the two models or provide other evidence on the extent of their interaction in this matter.<sup>700</sup> I understand that the bounds I consider (0% and 100%) encompass all of the pass-through rates put forward by experts in this case.

330. Dr. Leonard's discussion of marginal costs is also flawed. He criticizes some of the examples of potential marginal costs that I lay out in my Opening Report.<sup>701</sup> But his definition of marginal costs is not standard. Economists define marginal costs to be costs that increase as a result of increasing the quantity of production, as opposed to fixed costs which do not depend on quantity.<sup>702</sup> However, Dr. Leonard seems to suggest that marginal costs are only those that affect pricing.<sup>703</sup> In the context of focal point pricing or menu costs, which Dr. Leonard thinks are important for apps, changes in marginal cost may not be reflected in price. Dr. Leonard says that my analysis "confuses marginal costs with (average) variable cost." It is as

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<sup>698</sup> See Rysman Rebuttal Report Backup Production. In addition, in response to Dr. Leonard's concern that I do not account for COVID-19's effect on sales in my projections of sales to extrapolate damages to June 5, 2023 (Leonard Report, footnote 158), I rerun projections using only the most recent pre-COVID-19 data from 2018 to 2019. The results show that the welfare effects for the period August 16, 2016 to June 5, 2023 are about 4% lower if I account for the COVID-19 pandemic (See Rysman Rebuttal Report Backup Production). Dr. Leonard goes further and states that "[r]ather than calculating damages on unsupported sales projections, Dr. Rysman could calculate damages based on the actual sales data when those data become available." (Leonard Report, footnote 158).

<sup>699</sup> Leonard Report, ¶¶ 31-33. See also, ¶¶ 122-126; Appendix E, ¶¶ 8-14.

<sup>700</sup> Interestingly, Dr. Leonard's pass-through estimate does not come up to be negative and statistically significant. See Leonard Report, ¶¶ 51.

<sup>701</sup> Leonard Report, ¶¶ 128-132.

<sup>702</sup> See e.g., Mankiw, N. Gregory, *Principles of Microeconomics*, Fifth Edition, Mason, OH: South-Western CENGAGE Learning, 2008 (hereafter "Mankiw (2008)"), pp. 274-276.

<sup>703</sup> Leonard Report, ¶ 129.

if Dr. Leonard believes that a cost can be part of variable cost but not marginal cost. But variable cost is defined to be the sum of marginal costs over the units produced. If the marginal costs of the first three units produced are 6, 5, and 4, the variable cost of the first three units is 15 (because  $6+5+4=15$ ). It is impossible that a cost could be part of variable cost and not marginal cost. Similarly, average variable cost is simply variable cost divided by quantity. Thus, it is similarly impossible that a cost could be part of average variable cost and not marginal cost. This confusion leads Dr. Leonard to make puzzling statements such as: “[a]s a firm grows and serve[s] more customers, certain cost categories may increase as well. However, the marginal cost associated with a small increase in sales may still be zero or near zero.”<sup>704</sup> He seems to want to have it both ways: he admits that costs go up as a firm increases in size but denies that marginal cost is positive. This is contradictory. To the extent that his discussion points to a possible lumpiness of marginal costs (*e.g.*, if in the example above, marginal cost of the first three units produced are 0, 0, and 15), he presents no evidence that this is important in this setting. In addition, in economics it is not a common practice to model lumpy marginal costs.<sup>705</sup>

331. Getting to the bottom of what is marginal cost and what is not is not critical. The only technical requirement for my model with regard to marginal cost is that it is any value greater than zero. Dr. Leonard acknowledges this point (“the assumptions of [Rysman’s] model require that marginal cost must be positive for all apps.”),<sup>706</sup> and nevertheless, he does not contend that marginal costs are zero. Indeed, he states that “marginal cost tends to be small and even negligible in some cases for digital goods is well-recognized” and provides sources to support his statement.<sup>707</sup> None of the three academic sources that he cites claim that marginal costs are exactly zero. Dr. Leonard further relies on testimony from Mr. Sweeney, the CEO of

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<sup>704</sup> Leonard Report, ¶ 129.

<sup>705</sup> An example of lumpy cost would be when more workers are needed to produce more output but a firm would not necessarily hire an additional worker (or labor hour) for each additional unit produced. Indeed, none of the papers that Dr. Leonard cites in ¶ 127 of his report study lumpy marginal costs.

<sup>706</sup> Leonard Report, ¶ 128.

<sup>707</sup> Leonard Report, ¶ 127.

Epic Games, that the marginal cost of V-Bucks (an in-game currency) is zero.<sup>708</sup> However, that is not sufficient to argue that the marginal cost of additional consumers is zero. Even within the narrow evidence that Dr. Leonard relies on, V-Bucks have no value to players by themselves. V-Bucks are used to purchase in-game accessories such as enhancements to characters that players control. To the extent that these enhancements rely on downloading new code, they require hosting and internet transmission, which has a cost.

**D. Dr. Leonard Misunderstands and Mischaracterizes My Damages Quantifications**

332. Dr. Leonard states that “Dr. Rysman offers... a variety damages calculation (that assumes that the number of apps would have been higher in the but-for world than the actual world, but that the service fee rate would have been the same), and a hybrid calculation (that assumes that both the number of apps would have been higher and the service fee rate would have been lower in the but-for world than in the actual world).”<sup>709</sup> This is not correct. Dr. Leonard misunderstood my calculations of damages.

333. My variety damages calculation does not assume that “service fee rate” is fixed. In such a case, the model would not predict an increase in the number of apps due to a lower commission (or “service fee rate” as Dr. Leonard calls it). Instead, my variety damages calculation assumes 0% “pass-through” (*i.e.*, that app and in-app content prices would not drop in the but-for world, but the “service fee rate” would). On the other hand, my “hybrid calculation” relaxes that assumption and allows both the unique number of apps and prices to respond to changes in Google’s commission in the but-for world.

**E. Dr. Leonard’s Criticism That My Model Does Not Account for Ad-Supported Apps is Speculative and Without Merit**

334. Dr. Leonard notes that my model does not account for free and ad-supported apps. He asserts that “[t]his omission is problematic because some of the increased ‘variety’ in paid

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<sup>708</sup> Leonard Report, ¶ 130.

<sup>709</sup> Leonard Report, ¶ 118.

apps that Dr. Rysman claims would have entered may in fact just have been apps switching from being free or ad-supported to being paid.”<sup>710</sup> Dr. Leonard’s claim is speculative and baseless. He does not provide any evidence to support his claim. For example, he does not provide an estimate of substitution between advertising and paid models. Indeed, Google’s AdMob and Monthly App Revenue Data show that from August 2016 to December 2021 the percentage of apps that switched from ad-supported monetization strategy to paid app monetization strategy was about █%.<sup>711</sup>

335. In addition, to the extent that some apps would switch monetization strategy from ad-supported to paid, new free apps with ad-supported monetization strategy would likely enter to fill the place of existing free apps. Thus, my damages model can be viewed as conservative in this regard as it does not account for the latter.

#### **F. Dr. Leonard’s Heterogeneity Criticisms are Misplaced**

336. Dr. Leonard criticizes me for using a “highly stylized model... [that] will not be suitable for quantitatively assessing damages in a real-world context.”<sup>712</sup> He criticizes me for the symmetry assumption I make and states that it is not consistent with the reality and that my model would not be workable if that assumption were relaxed.<sup>713</sup> Below, I provide various evidence and economic arguments showing that Dr. Leonard’s criticism is incorrect.

337. Before I consider Dr. Leonard’s specific arguments and evidence, it is helpful to emphasize that an economic model must necessarily operate at some level of generality. To make it tractable to answer complicated economic questions, economists build models that set aside immaterial details and focus on the most important aspects that pertain to a given question

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<sup>710</sup> Leonard Report, ¶ 137.

<sup>711</sup> See Exhibit 4.

<sup>712</sup> Leonard Report, ¶¶ 134-135.

<sup>713</sup> Leonard Report, ¶¶ 140-154.

under consideration.<sup>714</sup> Dr. Leonard's criticism that my model is stylized and abstracts from various heterogeneity misses this point.

338. Especially when studying large economic systems, economists often use a small number of parameters in their models. For example, as I explained in my Opening Report, the constant elasticity of substitution (CES) assumption has been used when studying trade between countries for a wide variety of differentiated goods, including in papers published in the most highly regarded economic journals.<sup>715</sup> In addition, it has been a general trend in macroeconomics to use a few parameters for models of economies that represent aggregations across large varieties of consumers and firms.<sup>716</sup>

339. Google manages an app store with millions of apps and developers. Because the pricing and entry decisions are made for millions of apps that are not perfect substitutes for each other, I deem it most appropriate to approach modeling of the many differentiated products akin

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<sup>714</sup> See e.g., Mankiw, N. Gregory, *Principles of Microeconomics*, Fifth Edition, Mason, OH: South-Western CENGAGE Learning, 2008 (hereafter "Mankiw (2008)"), pp. 23-24 ("economists assume away many of the details of the economy that are irrelevant for studying the question at hand. All models... simplify reality to improve our understanding of it.").

<sup>715</sup> Rysman Opening Report, ¶ 581 See also, Helpman, Elhanan, Marc Melitz, and Yona Rubinstein. "Estimating trade flows: trading partners and trading volumes," *Quarterly Journal of Economics*, Vol. 123, No. 2, 2008, pp. 441-487; Bernard, Andrew, B., Jonathan Eaton, J. Bradford Jensen, and Samuel Kortum, "Plants and Productivity in International Trade," *American Economic Review*, Vol. 93, No. 4, 2003, pp. 1268-1290; Eaton, Jonathan, and Samuel Kortum. "Technology, Geography, and Trade." *Econometrica*, Vol. 70, No. 5, 2002, pp. 1741-1779. (hereafter "Eaton and Kortum (2002)"). Importantly, Eaton and Kortum (2002) estimate their model using bilateral trade in manufactures for a cross-section of 19 OECD countries in 1990 (p. 1742) which is a much broader level of aggregation than I use.

<sup>716</sup> See e.g., Hansen, Gary D., "Indivisible labor and the business cycle," *Journal of Monetary Economics*, Vol. 16, Issue 3, 1985, pp. 309-327 (hereafter "Hansen (1985)"); Hsieh, Chang-Tai, and Peter J. Klenow, "Misallocation and Manufacturing TFP in China and India," *The Quarterly Journal of Economics*, Oxford University Press, Vol. 124, No. 4, 2009, pp. 1403-1448 (hereafter "Hsieh et al (2009)") (the authors assume the industry aggregate output is represented by CES aggregate function. Although, they state that their "single  $\sigma$  [CES parameter] is a strong simplifying assumption," (see at p. 1414) they still use a conservative estimate of the parameter for their calculations by choosing it "conservatively at the low end of empirical estimates." (see at p. 1425). Importantly, Hsieh et al (2009) use a single CES parameter to represent much broader industries than I do. In particular, they apply their model to industries represented by 4-digit ISIC codes. Examples of 4-digit ISIC codes are 6201 (Computer Programming Activities) and 5820 (Software Publishing). See Siccocode, "ISIC (International) for 'software'," available at <https://siccocode.com/search-isic/software>. Developing apps for Android would be only a small share of these categories. See also Atkeson, Andrew and Ariel Burstein, "Aggregate Implications of Innovation Policy," *Journal of Political Economy*, 2019, Vol. 127, No. 6, pp. 2625-2683.

to a model of a large economy. If I were asked to study, for example, a merger between two firms, the types of questions I would need to answer, the level of abstraction, and the focus would be different from the current case. Fine details about exactly how substitutable the products of those two firms are relative to other nearby products would be more relevant for such analyses and thus the modelling approach would likely be different from the current case.

340. Given the above and the goal of understanding and quantifying the welfare effects of Google's conduct at the aggregate level, I chose a workhorse model in economics that has been used by numerous authors over several decades. A model of monopolistic competition describes a market structure with many firms selling products that are similar but not identical. Product differentiation provides price setting power to the firms (as opposed to firms being price-takers as under perfect competition) and leads to non-zero markups over marginal cost. Firms do not have as much pricing power as a monopolist would have and hence the market structure lies somewhere between monopoly and perfect competition.<sup>717</sup> Differentiated products also imply consumer surplus from the introduction of new products and thus consumers value variety. In the long run, there is entry of new firms in a monopolistically competitive market as long as firms make non-zero long-run profits. This process determines the number of products in the market and the welfare that consumers obtain from the market.<sup>718</sup>

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<sup>717</sup> It is closer to perfect competition compared to duopoly or oligopoly models. *See e.g.*, Mankiw (2008), p. 347: (explaining that “oligopoly and monopolistic competition are quite different. Oligopoly departs from the perfectly competitive ideal... because there are only a few sellers in the market. The small number of sellers makes rigorous competition less likely and strategic interactions among them vitally important. By contrast, under monopolistic competition, there are many sellers, each of which is small compared to the market.”).

<sup>718</sup> Mankiw (2008), pp. 345-354; Church, Jeffrey and Neil Gandal. “Complementary network externalities and technological adoption,” *International Journal of Industrial Organization*, Vol. 11, No. 2, 1993, pp. 239-260 (hereafter “Church and Gandal (1993)”); Dixit, Avinash K. and Joseph E. Stiglitz, “Monopolistic Competition and Optimum Product Diversity,” *The American Economic Review*, Vol. 67, No. 3, 1977, pp. 297-308 (hereafter “Dixit and Stiglitz (1977)”); Nair, Harikesh, Pradeep Chintagunta, and Jean-Pierre Dubé, “Empirical Analysis of Indirect Network Effects in the Market for Personal Digital Assistants,” *Quantitative Marketing and Economics*, Vol. 2, 2004, pp. 23–58 (hereafter “Nair et al (2004)”); Hsieh et al (2009).

1. *Dr. Leonard Incorrectly Claims That My Model Incorporates Only Two Empirically Determined Figures*

341. Dr. Leonard claims that my damages work depends “crucially” on only two “inputs”: the but-for commission and the own price elasticity of demand parameter.<sup>719</sup> This mischaracterizes my model. In addition to those two parameters, my damages model depends on Google’s actual world commission, actual world and but-for discounts to consumers, developer fixed costs, and consumer expenditure on app and in-app content. All those are empirically determined figures.

342. In addition, to calibrate a developer’s fixed cost, I use information on the number of apps on Google Play in the actual world. I also conduct regressions to estimate own-price elasticity of app and in-app demand (although, to be conservative, I use the elasticity from the literature) where I use data on app and in-app content prices, the number of transactions, and tax rates. In those regressions, I control for app, time, and purchase type (paid download, subscription, and other IAP) fixed effects, which represent thousands of fixed effects. All those fixed effects are additional parameters that determine my estimate of elasticity. Thus, Dr. Leonard’s characterization of my work is misleading, incorrect, and oversimplified.

2. *Dr. Leonard Incorrectly Claims That Many Apps Generate Revenue Through the Sale of Multiple Products*

343. Dr. Leonard criticizes me for assuming that “each app generates revenue through the sale of a single ‘product’ at a single ‘price.’”<sup>720</sup> Dr. Leonard claims that I do not distinguish between IAP, download, and subscription prices and that “[t]he demand curves, costs, or pass-through for these different products may well be different.” He further claims that “[m]any apps generate revenue through the sale of multiple products, such as the initial download and IAP.”<sup>721</sup> There are several problems with Dr. Leonard’s criticism.

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<sup>719</sup> Leonard Report, ¶134; Leonard Report, Appendix E, ¶¶ 2-3.

<sup>720</sup> Leonard Report, ¶ 139.

<sup>721</sup> Leonard Report, ¶ 139.



344. First, his claim that “[m]any apps generate revenue through the sale of multiple products, such as the initial download and IAP” is baseless and simply wrong. As I show in Exhibit 23, the share of apps that have charged for both downloads and IAP has been less than █% in the period between August 2016 and 2021.

**Exhibit 23**  
**Percentage of Apps That Charge for Only Downloads, Only In-App, and Both**

<b>Year</b>	<b>Only Downloads</b>	<b>Only In-App</b>	<b>Both</b>
<b>2016</b>	56.57%	42.12%	1.31%
<b>2017</b>	52.95%	45.79%	1.26%
<b>2018</b>	46.73%	51.93%	1.34%
<b>2019</b>	██████	██████	██████
<b>2020</b>	██████	██████	██████
<b>2021</b>	██████	██████	██████
<b>Total</b>	██████	██████	██████

*Notes:*

1. In-app transactions include subscriptions and other in-app content.
2. Year 2016 figures start from August, 2016.
3. Excludes observations that had negative values or zero for transaction volume, negative values or zero for net consumer expenditure net of developer discount. Also, excludes observations with price greater than \$400, where price is calculated by dividing net consumer expenditure net of developer discount by transaction volume.
4. This table only keeps device types that are phones, tablets, or missing/null/unknown.

*Source:* Google Monthly App Revenue Data.

345. Second, Dr. Leonard does not discuss or show the importance or implications of considering IAP, download, and subscription prices separately and then aggregating the model to generate aggregate damages rather than analyzing aggregate market to start with. Dr. Leonard also ignores the fact that in my demand estimations I controlled for app purchase-type fixed effects (download, subscription, and other in-app). This means that in my regressions I accounted for the potential effects of the purchase type on demand.

346. Finally, as I have discussed above, it is common in economics to use a single CES parameter to represent much broader industries (and categories of goods) than I do.

3. *Dr. Leonard’s Description of Heterogeneity Across Apps Is Redundant*

347. Dr. Leonard claims that “Dr. Rysman assumes that all apps have the same quality parameter, the same demand function, the same marginal cost, the same entry cost, the same

price, and the same quantity of sales. Without this ‘symmetry’ assumption, Dr. Rysman’s model would be unworkable.”<sup>722</sup> He further provides descriptive data showing that apps charge different prices and have different levels of sales and usage.<sup>723</sup> This criticism is redundant and without clear and empirically supported conclusions about the implications of heterogeneity for aggregate damages.

348. First, Dr. Leonard does not properly acknowledge my discussion of heterogeneity and why my approach is robust to it in certain aspects.<sup>724</sup> As I showed in my Opening Report, under the assumption of heterogeneous marginal costs and quality across apps, where apps know exactly about their quality and marginal costs, and price accordingly, the resulting equation for average price closely approximates the pricing equation that I derive from my model. In addition, in my Opening Report I have accounted for heterogeneity on the demand (consumer) side by using variation in sales tax rates, prices, and transactions to estimate own-price demand elasticity. In my estimation, I also controlled for app, time, and purchase type (paid download, subscription, and other IAP) fixed effects.

349. Second, to further show the robustness of my results, in Appendix C I extend my baseline damages model to explicitly allow for heterogeneity in marginal costs and app quality. I show that, under the assumption that app quality and marginal costs are uncertain and completely unpredictable, for the purpose of estimating aggregate damages, my results would be unchanged. The equations, to estimate aggregate damages, that I obtain from the model that explicitly starts with the heterogeneity assumptions, unpredictability assumption, and a large economy assumption (*i.e.* a large number of firms), are the same as the equations that I obtain from my baseline model under the homogeneity assumptions, unpredictability assumption, and a large

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<sup>722</sup> Leonard Report, ¶ 140.

<sup>723</sup> Leonard Report, ¶¶ 140-144.

<sup>724</sup> Rysman Opening Report, ¶ 572 (“I show in Appendix F that the pricing equation that I derive closely approximates the average pricing equation that would arise in a model with heterogeneous marginal costs. While the costs discussed above may vary across different apps, the predicted price from my model approximates the average price that would arise, in that setting.”); Rysman Opening Report, Appendix F footnotes 7-8.

economy assumption. Thus, it does not matter whether I model heterogeneity in quality and marginal cost or use the “aggregate” or “average” model. This analysis also shows that Dr. Leonard’s claim that my model is unworkable without symmetry assumption is wrong.

350. Third, Dr. Leonard’s reading of my model and assumptions is too literal. As I have explained above and shown in Appendix C, my model is tailored to study the aggregate welfare effects in an economy with a large number of differentiated products. The point of my model is that consumers benefit from more choices and to measure that benefit. To the extent I rely on symmetry, it is an abstraction. Dr. Leonard’s evidence shows how quantity, prices, and usage are different across apps. I do not dispute that. However, this evidence does not rebut my model and completely misses the point and objective of my analysis. The objective is to understand if and how aggregate welfare was harmed as a result of Google’s conduct. In order to answer this question, one should look at the market in the aggregate and from an ex-ante perspective (*i.e.*, before apps would make their initial entry decisions) and use ex-post (*i.e.*, after apps have entered the market) heterogeneity explicitly whenever necessary for the analyses. For example, as discussed above, for estimating the own-price elasticity of demand, I explicitly used variation in ex-post (or realized or actual) quantities, prices, and sales taxes. I also controlled for app fixed effects (among other factors) to account for potential quality heterogeneity across apps.<sup>725</sup> Thus my own-price elasticity of demand estimate accounts for the variation in all those variables because my regression uses the heterogeneity across apps to generate the estimate.

#### 4. *Dr. Leonard Purports That the Assumption of Ex-Ante Unpredictability of App Quality Is Incorrect*

351. Dr. Leonard criticizes my assumption of ex-ante symmetry (*i.e.*, app developers cannot predict their success before creating an app and entering an app store) based on a combination of mostly irrelevant evidence and unsupported arguments.

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<sup>725</sup> See Rysman Opening Report, § IX.C describing my regression model.

a) Dr. Leonard's Criticism that the Average Quality of New Apps Would be Lower is Without Basis

352. Dr. Leonard's claim that average quality of new apps would be lower is baseless.<sup>726</sup> He does not support his claim with any empirical analyses or other evidence. His oversimplistic model with asymmetric ex-ante quality is also baseless and constructed in a circular way *i.e.*, the result is obtained by construction of the model. He assumes parameter values for the model such that the model generates the results that he desires (rather than estimating parameters from the data or obtaining sensible and conservative estimates from the literature).<sup>727</sup> For example, one of the assumptions of Dr. Leonard's model is that there is a fixed number of potential entrant apps. In Dr. Leonard's model, when Google's commission decreases from 30% to 15%, by construction, there are no more high-quality apps available to enter the market and thus it is either the case that low quality apps enter, or no additional entry occurs.<sup>728</sup>

353. Dr. Leonard also completely misses the point that enhanced competition generally improves product quality rather than reducing it.<sup>729</sup> Under the enhanced competition, firms compete more aggressively for customers and tend to offer better products, among other benefits. Given this simple intuition and evidence, one might expect average app quality to increase in the

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<sup>726</sup> Leonard Report, ¶ 151.

<sup>727</sup> Leonard Report, Appendix E, ¶¶ 35-40

<sup>728</sup> See Leonard Report, Appendix E, ¶ 38. ("Thus, despite the lower commission rate, there would be no additional variety in the 'real world' with quality asymmetry. The reason for this is that the apps that did not enter with the higher commission rate are those with relatively low quality. Even with the lower commission rate, they are not profitable because of their lower quality. There is a 'selection problem'—the apps that entered are of higher average quality than the apps that did not enter.").

<sup>729</sup> See *e.g.*, Boushey, Heather and Helen Knudsen, "The Importance of Competition for the American Economy," *The White House*, July 9, 2021, available at <https://www.whitehouse.gov/cea/written-materials/2021/07/09/the-importance-of-competition-for-the-american-economy>: ("Basic economic theory demonstrates that when firms have to compete for customers, it leads to lower prices, higher quality goods and services, greater variety, and more innovation."); Matsa, David A., "Competition and Product Quality in the Supermarket Industry," *The Quarterly Journal of Economics*, Volume 126, No. 3, 2011, pp. 1539–1591 (noting that "[t]he risk that customers will switch stores appears to provide competitors with a strong incentive to invest in product quality.") p. 1539; Busso, Matias and Sebastian Galiani, "The Causal Effect of Competition on Prices and Quality: Evidence from a Field Experiment," *American Economic Journal: Applied Economics*, Vol. 11, No. 1, 2019, pp. 33-56 (showing that competition increases quality of products that consumers perceive) at p.36.

but-for world rather than decrease. This indeed would suggest that my approach can be regarded as conservative because my model implies that average app quality remains unchanged.

b) Dr. Leonard's Criticism that Janßen et al. (2022) Does not Support the Assumption of Unpredictability Is Flawed

354. Dr. Leonard claims that Janßen et al. (2022) is not applicable to support the assumption of unpredictability of app success (or quality) in this case.<sup>730</sup> His arguments are without basis.

355. First, Dr. Leonard notes that Janßen et al. (2022) “included all apps the authors were able to collect from Google Play store, free, ad-supported, paid, subscription or IAP-based.” Further, he states that “[b]ecause the Janßen, et al. (2022) study did not perform any targeted study on paid apps or apps with IAPs, there is no analogous evidence for the apps Dr. Rysman focused on exclusively.”<sup>731</sup> However, it is not clear what the standard for “analogous evidence” represents for Dr. Leonard. He does not explain this standard, nor does he discuss the implications of using a result based on Janßen, et al. (2022) data. Results from Janßen, et al. (2022) are useful for learning about the Play Store even though their data set is not exactly the same as the one I use (*i.e.*, I use Google Transaction Data which was produced without information about free apps).

356. Second, Dr. Leonard notes that “the authors of the study [Janßen, et al. (2022)] noted that their results did suggest partial predictability.” He further purports that “Dr. Rysman failed to assess how robust his damages calculations would be under partial predictability.”<sup>732</sup> Dr. Leonard fails to acknowledge that complete unpredictability is the main result (baseline model) in Janßen, et al. (2022) and partial unpredictability is a sensitivity.<sup>733</sup> I do not have to replicate sensitivities in the paper in order to rely on its main finding. In addition, it is worth

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<sup>730</sup> Leonard Report, ¶ 149-150.

<sup>731</sup> Leonard Report, ¶ 150.

<sup>732</sup> Leonard Report, ¶ 150.

<sup>733</sup> Janßen, Rebecca, Reinhold Kesler, Michael E. Kummer, and Joel Waldfogel, “GDPR and the Lost Generation of Innovative Apps,” NBER Working Paper Series, 2022 (hereafter “Janßen et al (2022)”), at p. 30.

noting that the authors hold themselves to a very high standard in testing for the predictability of quality. They test for the equality of the reduction in the number of apps and the usage of apps (*i.e.*, based on volumes of user ratings or cumulative installations), and regard any evidence that usage went down by less than the number of apps as evidence of predictability. However, if the number of new apps falls, we might expect apps that still enter the market to have higher usage even if the new apps have the same quality distribution just because there are fewer apps in the market. Moderate increases in usage could still be consistent with no predictability. Given the small differences between the usage rate and app entry even in their most unfavorable statistics (which they view as a sensitivity), I do not see evidence in favor of important app success predictability.

357. Finally, Dr. Leonard states that “GDPR increased uncertainty for many developers” and further speculates that this uncertainty “coupled with the penalty structure of General Data Protection Regulation (GDPR) may drive out both ex-post successful and ex-post unsuccessful apps, even if app success is predictable. Because violating GDPR could result in fines to developers up to a proportion (4%) of annual revenue (or 20 million EUR, whichever is larger), if app success is in fact predictable, uncertainty related to compliance can drive out precisely the predictably successful apps.”<sup>734</sup> However, this is flawed for several reasons. First, suppose one believes that GDPR increased uncertainty in a similar way for high- and low-quality apps. If the quality of an app is predictable then (according to Dr. Leonard’s intuition stemming from his model, with asymmetric quality and perfect predictability, in Appendix E) one should see a decrease in the entry of the low-quality apps relative to the high-quality apps. However, the main result of Janßen, et al. (2022) suggests that that entry decreased in the same proportion for all apps.<sup>735</sup> So, this means that quality is not predictable. Second, the story that the penalty structure may drive out predictably successful apps more than predictably less successful is counterintuitive. Under the penalty structure, if anything, one would expect that predictably less

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<sup>734</sup> Leonard Report, ¶ 150.

<sup>735</sup> Janßen, et al. (2022), pp. 22-24, 30.

successful apps would be driven out more than predictably successful apps. This is because a 20 million EUR fine for violating GDPR would be a far higher burden for less successful apps with low revenues compared to a penalty of 4% of annual revenue for large apps. Even if one considers Dr. Leonard’s counterintuitive conclusion that the penalty structure would drive out predictably successful apps, it may well be that predictably successful apps would have stronger incentives to mitigate risks associated with GDPR compliance which would make it more likely that they would not be driven out and hence mitigate Dr. Leonard’s concern.

358. Dr. Leonard also cites to several sources suggesting that venture capital firms, large developers, and researchers try to predict app success.<sup>736</sup> While these represent individual cases, my opinion is that the results of Janßen et al. (2022) provide a good approximation to the unpredictability assumption as it pertains to the Google Play Store in its entirety. The paper also directly uses entry (which is directly relevant for my model) to study whether app success is predictable, finding that success is unpredictable in the sense that the distribution of app quality would likely remain unchanged after a shock to developer costs. Hence, the average quality would likely remain unchanged.

359. In conclusion, Dr. Leonard’s criticism that Janßen et al. (2022) is not applicable to support the assumption of unpredictability of app success (or quality) in this case, is based on arguments that do not change my opinion.

c) Dr. Leonard’s Claim That Malicious Apps Would Lower  
Consumer Welfare in the But-for World is Speculative

360. Dr. Leonard purports that I “failed to recognize” that malicious apps could enter in the but-for world.<sup>737</sup> As explained above, because app success is unpredictable, Janßen et al. (2022) found that increased GDPR costs did not change the mix of successful and unsuccessful apps. Similarly, a reduction in the commission rate likely would not change the total mix of “good” and “bad” apps and hence the average app quality would remain unchanged. For Dr.

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<sup>736</sup> Leonard Report, ¶ 147.

<sup>737</sup> Leonard Report, ¶ 151.



Leonard's criticism to change my opinion, he would need to demonstrate that the share of malware apps among total apps would increase in the but-for world. He supplies no such analysis

361. There are good reasons to doubt that malware would enter, swamping gains to consumer welfare with decreases to consumer welfare. If anything, Google would likely have stronger incentives to screen apps for malware in the but-for world. Dr. Leonard does not provide any indication and certainly does not provide any evidence that Google or other app stores would spend fewer resources on app screening or that there would be more malicious apps in the but-for world relative to the actual world.

5. *Dr. Leonard's Criticism of the Normalization of the App Quality Parameter in My Model is Misleading*

362. Dr. Leonard criticizes my normalization that the quality parameter is equal to 1 for all apps as inconsistent with ex-ante symmetry of apps in my model.<sup>738</sup> However, this criticism is redundant and misleading. As I have stated in my Opening Report, my model assumes that all apps have the same expected quality.<sup>739</sup> Here, I formally show that, for the damages purposes, this assumption is equivalent to explicitly introducing heterogeneity in the model and then solving under the assumption of unpredictability.

363. As I show in Appendix C, introducing marginal cost and app quality heterogeneity is straightforward in my model. I extend my baseline damages model to explicitly allow for such heterogeneity across apps. I solve the model and show that, under unpredictability (or ex-ante symmetry), the equations for quantifying welfare effects are the same as in my baseline damages model in which I set app quality to 1 for all apps. Hence, this shows that Dr. Leonard's claim that assuming app quality of 1 is inconsistent with ex-ante symmetry of apps in my model is misleading.

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<sup>738</sup> Leonard Report, Appendix E, ¶¶ 32-34.

<sup>739</sup> Rysman Opening Report, ¶ 575.

6. *Dr. Leonard Claims that the Symmetry Assumption with Respect to Entry Cost is False but Does Not Explain the Implications of that Point*

364. Dr. Leonard claims that the symmetry assumption with respect to entry cost (or developer's fixed cost) is false but does not explain any implications of that assumption and does not provide an alternative quantification of damages.<sup>740</sup>

365. Dr. Leonard's criticism is flawed for at least two reasons. First, his own cited figures suggest that app development costs can be as low as \$10,000 which is below my estimate of fixed cost. Thus, the average fixed cost can well be around my estimate of fixed cost. Second, Dr. Leonard's range is incomplete. Indeed, one of the sources that he cites states that, "[w]ith \$22 per hour for creating an app, the cost of building a simple app in India ranges between \$4,800 and \$11,200. The development of a complex app would cost \$12,800 to \$22,400, and that of an advanced-level app could cost at least \$20,800. While these are the rates for iOS and cross platform apps, Android apps come even cheaper."<sup>741</sup> Hence, Dr. Leonard's claim that the prediction of my model is inconsistent with the facts (*i.e.*, the range of costs of developing an app) is incorrect.

366. Finally, the assumption of symmetry with respect to the entry costs is an abstraction which, as I have explained above, is a necessary feature of an economic model.

**G. Dr. Leonard's Complaint that I Have Not Identified Apps that Did Not Enter Because of High Commission is Irrelevant**

367. Dr. Leonard criticizes me for not identifying specific apps or developers who did not enter because of Google's high commission; and not providing evidence from developers about the extent to which service fee plays a role in entry decision.<sup>742</sup> In addition, Dr. Leonard purports that "[i]n fact, after the July 2021 Google Play service fee rate reduction, there was no observable spike in either the number or the growth rate of apps that offer paid downloads, IAPs,

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<sup>740</sup> Leonard Report, ¶ 146.

<sup>741</sup> Sebastian, Nathan, "How Much Does It Cost to Develop an App? | GoodFirms Survey," *GoodFirms*, available at: <https://www.goodfirms.co/resources/cost-to-develop-an-app>.

<sup>742</sup> Leonard Report, § VII.C.1.d.

or subscriptions and incurred sales (based on Google Play’s transactions data).”<sup>743</sup> To support his statement, he shows monthly total number of apps and their growth rates over time.<sup>744</sup>

368. There are a number of problems with Dr. Leonard’s arguments and analysis which I explain below.

369. First, I do not need to show specific apps that did not enter—basic economic theory provides the intuition that entry is linked to expected profits of a firm and that higher expected profits motivate entry.<sup>745</sup> It is a widely accepted economic principle that the more something is taxed, all else equal, the less of it there is.<sup>746</sup>

370. Second, other Google’s experts seem to not contest that profitability of the app store for developers drives entry and investment. For example, Dr. Tucker has section headings titled “Apple and Google compete to Attract Developer’s Investments,” and “Apple and Google Compete to Enhance Developers’ Revenues.”<sup>747</sup> While I dispute how Dr. Tucker characterizes competition, there is no question that Google desires developer investment and this can be accomplished in part by increasing developer revenues. She quotes a Google document as saying “if developers can’t monetize well, they’re less likely to support, which means less cool content, which means not only does Play make less money [but] Android becomes less attractive...and Google loses all around.”<sup>748</sup> It is difficult to think of a more direct way to increase developer revenue than cutting the commission rate, especially under the low pass-through rates proposed by Dr. Leonard. It is contradictory to continually claim that app revenue leads to app entry and

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<sup>743</sup> Leonard Report, ¶ 156 .

<sup>744</sup> Leonard Report, Figures 23 and 24.

<sup>745</sup> Mankiw (2008), at pp. 349-350; Church and Gandal (1993), at pp. 247-249; Dixit and Stiglitz (1977), at p. 300; Nair et al (2004), at pp. 38-39; Berry, Steven T., “Estimation of A Model of Entry in the Airline Industry,” *Econometrica*, Vol. 60, No. 4, 1992, pp. 889-917 (hereafter “Berry (1992)”), at p. 892; Bresnahan, Timothy F. and Peter C. Reiss, “Entry and Competition in Concentrated Markets,” *Journal of Political Economy*, Vol. 99, No. 5, 1991, pp. 977-1009 (hereafter “Bresnahan and Reiss (1991)”), at p. 982.

<sup>746</sup> Mankiw (2008), pp. 72 and 250; NTRC Tax Research Journal, “Deadweight Loss and Taxation,” Vol. 24, No. 6, 2012, at p. 6.

<sup>747</sup> Tucker Report, § IV.C.3 and § IV.C.4.

<sup>748</sup> Tucker Report, ¶ 212 citing to Google, “Play Games Business and Trends Update - Q1 2016 Product Review,” February 23, 2016, GOOG-PLAY-000314953.R-981.R, at 960.R.

investment, as Google’s experts do, and then question whether reducing the commission rate will lead to app entry and investment.

371. Finally, Dr. Leonard’s analysis of monthly total number of apps over time is flawed and does not represent evidence that there would not have been entry of apps in the competitive but-for world:

- Dr. Leonard emphasizes that, after the July 2021 Google Play commission reduction there was no spike in app entry. However, this is misleading as App development, investment, and R&D decisions and processes usually take time. One would not expect to see an immediate (or short-run) spike in entry after the July 2021 Google Play commission reduction. For example, a source that Dr. Leonard cites suggests that the time required before a soft launch of a game can be in the range from 7 to 16 months. The soft launch itself, during which a game is made available for test launch in a few markets, can last an additional year or even more.<sup>749</sup>
- Dr. Leonard also uses the monthly total number of apps with non-zero sales for his figures 23 and 24. However, that is not a proper measure of entry. Entry would count the number of *new* apps in a given month. I correct his calculation using his input data. Exhibit 24 and Exhibit 25 show monthly and quarterly number of new apps with non-zero sales, respectively. Exhibit 24 shows that [REDACTED]. Exhibit 25 shows that [REDACTED]. In addition, Exhibit 26 shows the quarterly number of new apps with non-zero sales in a longer time horizon. It shows that entry [REDACTED]. For example, [REDACTED].<sup>750</sup> Entry started decreasing in 2022 when life

<sup>749</sup> Riikola, Atte, “Rovio: Extensive report,” Inderes, 2022, at pp. 9-10.

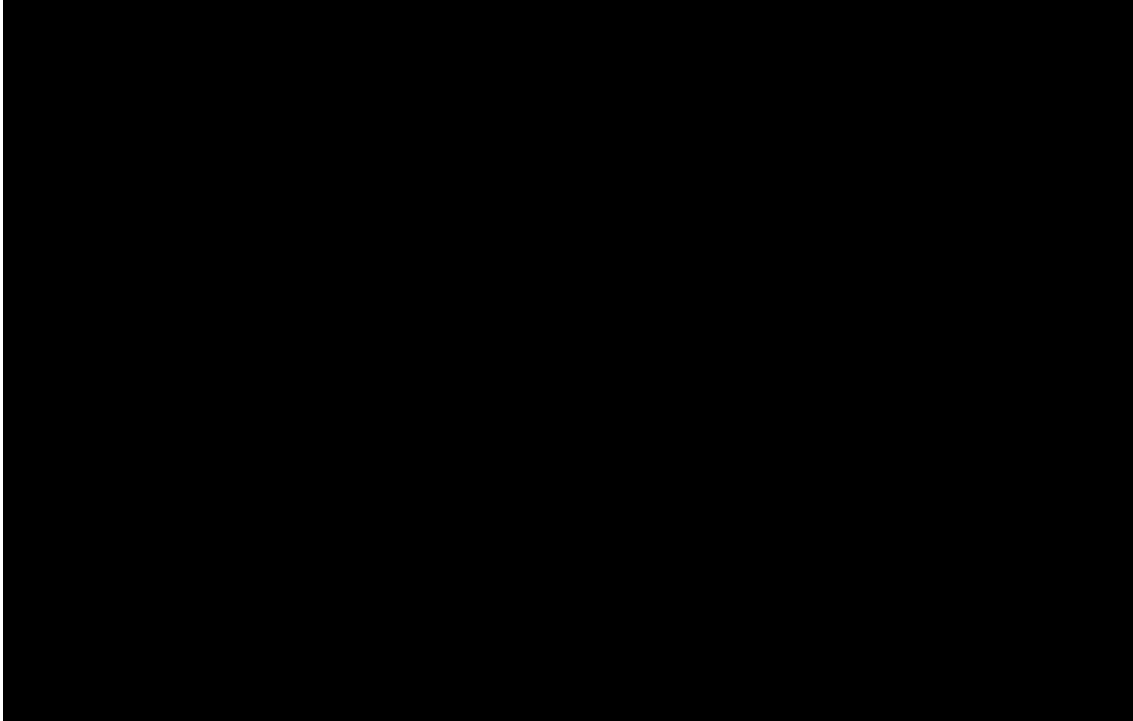
<sup>750</sup> See Rysman Rebuttal Report Backup Production.

started to return to pre-pandemic “normal.” Thus, the COVID-19 pandemic can be considered as a temporary positive shock to demand for apps. Thus, in the spirit of Dr. Leonard’s arguments, one could interpret the increase in entry as a response to that positive demand shock. Finally, Exhibit 26 also shows how [REDACTED]

[REDACTED].

**Exhibit 24**

**Monthly Number of New Apps with Non-Zero Sales, September 2020 – May, 2022**



*Source:* Leonard Report Backup Production.

**Exhibit 25**

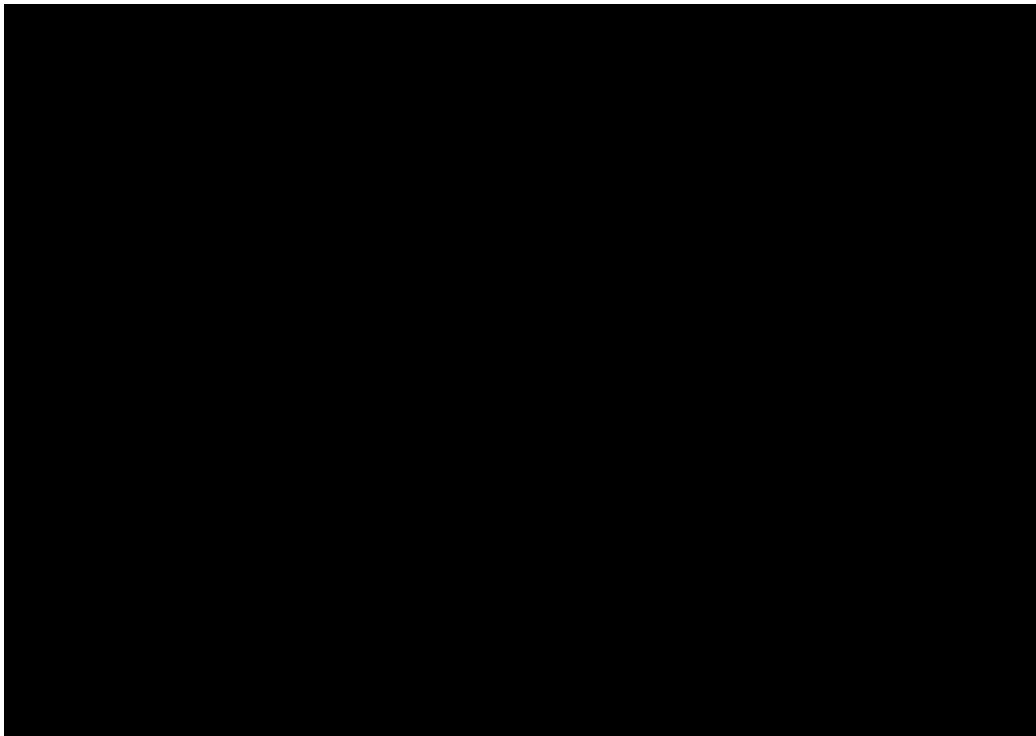
**Quarterly Number of New Apps with Non-Zero Sales, Q4 2020 – Q1 2022**



*Source:* Leonard Report Backup Production.

**Exhibit 26**

**Quarterly Number of New Apps with Non-Zero Sales, Q4 2016 – Q1 2022**



*Source:* Leonard Report Backup Production.

**H. Dr. Leonard's Criticisms of the CES Demand Model Fails to Acknowledge My Conservative Assumptions**

372. Dr. Leonard criticizes me for not providing enough support for the demand curve shape that I utilize.<sup>751</sup> He also notes that the CES model has been criticized in the academic literature “because of the restrictions they impose on the substitution patterns between products, a result of the independence of irrelevant alternatives (IIA) property.”<sup>752</sup>

*1. CES Demand is a Better Choice to Study the Market in This Matter*

373. Here, I elaborate on the benefits of the CES demand function. First, the CES demand function is a natural choice for this market. The CES demand function represents consumers making continuous choices at many products. By “continuous choice,” I mean the consumer chooses how much to purchase of each available product. Consumers can choose to consume more from an app that delivers high utility and less from an app that delivers low utility. That captures consumer activity on the Play Store, where consumers may interact with many apps and at each app, choose how much to use that app, such as how many in-app transactions to make.

374. The CES model is also attractive because it is very parsimonious. That is, it captures rich interactions with a relatively few parameters, which makes estimation straightforward, and makes transparent what drives my results. In the CES model, the price elasticity and benefit from variety are captured by a single parameter. This is natural because economics recognizes these two phenomena as two sides of the same issue. If two products are highly differentiated, then the two products contribute strongly to the benefit from variety. Similarly, if two products are highly differentiated, then they will not be close substitutes and, even if they are in the same market, they will have relatively inelastic demand. Analogously, if two products are very close substitutes, they will have high price elasticity and also will not offer

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<sup>751</sup> Leonard Report, footnote 164.

<sup>752</sup> Leonard Report, ¶¶ 153-154 and footnote 76.



much variety. Thus, a single parameter could capture both the benefits from variety and the price elasticity, and this is elegantly captured by the CES model.

375. Yet another attractive feature of CES model is that it leads to straightforward estimation equations. As I show in my original report, the CES model generates a regression of the log of quantity on the log of price.<sup>753</sup> In this model, the coefficient on the log of price can be directly interpreted as the elasticity. Such a model can be estimated with simple linear methods, such as ordinary least-squares or two-stage least squares.<sup>754</sup> This is probably the first model that many empirical economists see for how to estimate demand, because estimation is straightforward and interpretation is transparent. It follows naturally from applying the CES model to my data set to use app-fixed effects to control for app quality and time-fixed effects to control for the competitive environment the app faces. In contrast, Dr. Leonard recommends that I use more complex and non-linear estimation methods, such as the Berry, Levinsohn, and Pakes (1995) estimator.<sup>755</sup> These estimators are complex and require careful specification that can lead to debate about the results, as evidenced by the struggles documented in Knittel and Metaxoglou (2014).<sup>756</sup>

376. Another reason to choose the CES model is that it is very popular in economics. As I have explained above, it is particularly attractive to researchers modeling interactions between many firms in large economies, such as in the literatures of macroeconomics and international trade. Some of the most influential recent papers in these fields are Eaton and Kortum (2002) and Hsieh et al (2009), which both rely on the CES model. I believe this

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<sup>753</sup> Rysman Opening Report, Appendix F.

<sup>754</sup> Rysman Opening Report, ¶¶ 576-577.

<sup>755</sup> Leonard Report, footnote 76. Although Dr. Leonard recommends that I use Berry, Levinsohn, and Pakes (1995) as an estimator, he later states that this model would be inappropriate for app stores as a result of the criticisms in Armstrong, T., “Large market asymptotics for differentiated product demand estimators with economic models of supply,” *Econometrica*, 84 (2016), pp. 1961-1980. See Leonard Report, Appendix E, footnote 5. Dr. Leonard seems to have contradicted himself here.

<sup>756</sup> Knittel, Christopher R. and Konstantinos Metaxoglou, “ESTIMATION OF RANDOM-COEFFICIENT DEMAND MODELS: TWO EMPIRICISTS’ PERSPECTIVE,” *The Review of Economics and Statistics*, Vol. 96, No. 1, 2014, pp. 34-59.

literature is natural to draw from given that Google manages a large economy of apps on the Play Store.

377. Finally, Dr. Leonard criticizes me for not using a nested CES model for damages.<sup>757</sup> He speculates that “adding additional apps to existing nests is likely to be of relatively limited value to consumers.” He explains that “[f]or example, consider the weather apps. Adding an additional weather app, once multiple weather apps already existed, is likely to be less important to consumers than adding the first weather app (which would create the weather app nest) to the list of existing nests.”<sup>758</sup>

378. Dr. Leonard’s points in that regard are not substantiated by evidence or mathematical proofs. As I have discussed above, in the economics literature, it is common to use aggregate models with a level of aggregation of products which is at a higher level than I use in this matter. In addition, I have explained how an economic model and its assumptions should be tailored to the questions of interest rather than making a model arbitrarily complex.<sup>759</sup>

379. Furthermore, Dr. Leonard deems it unlikely that new entry would create new app categories (that is, new nests). However, this claim is unfounded. If lower commissions were to lead to innovation and the creation of categories, welfare benefits could be particularly large in this approach. My approach is conservative in not allowing this to happen.<sup>760</sup>

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<sup>757</sup> Leonard Report, Appendix E, ¶ 28.

<sup>758</sup> Leonard Report, Appendix E, ¶¶ 29-30.

<sup>759</sup> Note that, for example, Janßen et al. (2022) estimated a two-level nested logit demand model using app data on Google Play Store and found no reason to use two-level nested model: “[w]e also estimated a two-level nested logit demand model... with the outside good and each of the app categories as nests... The resulting substitution parameters for the substitution across and within nests were statistically indistinguishable and therefore provided no reason for using a two-level, rather than a one-level, nested logit model.” See Janßen et al. (2022), p. 28.

<sup>760</sup> Dr. Leonard claims that there would likely be no new app categories from new entry, but he is speculating and provides no support. See Leonard Report, Appendix E, ¶ 30.

2. *Dr. Leonard's IIA Criticism is Mitigated by Conservative Assumptions That I Impose on My Model and Is Less Relevant to My Analyses*

380. Dr. Leonard highlights an issue with the logit model called the independence of irrelevant alternatives (IIA). Dr. Leonard highlights an implication of IIA that the logit model places restrictions on the flexibility of substitution patterns in the data. This can lead to restrictive substitution patterns implied by the model, which can affect the evaluation of substitution between new and existing products.<sup>761</sup> Dr. Leonard cites several papers in this literature. This issue also applies to the CES model that I rely upon.

381. I agree that IIA can be problematic in some applications, but in economics, models must always be tailored to the question the model is meant to answer. Thus, it is important to recognize that the papers that Dr. Leonard cites focus on very different applications than the one I address. In particular, the papers he cites focus on evaluating substitution among a small number of products, which is a common question in the economics subfield of industrial organization.<sup>762</sup> For example, Dr. Leonard cites Nevo (2000) who studies mergers in the ready-to-eat breakfast cereal industry and restricts his sample to cover only 24 brands, with individual firms covering some subset of those.<sup>763</sup> Similarly, Hausman (1996) studies the introduction of a single new product, Apple-Cinnamon Cheerios, into the cereal market.<sup>764</sup> Brownstone and Train (1999) consider the choice among six hypothetical vehicle types with different characteristics (in particular, fuel types).<sup>765</sup> If I were asked to evaluate interactions among a small number of products, for instance a merger between two developers that create games for Android, I might

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<sup>761</sup> Leonard Report, ¶¶ 153-154 and footnote 76.

<sup>762</sup> Leonard Report, footnote 76.

<sup>763</sup> Nevo, Aviv, "Mergers with Differentiated Products: The Case of the Ready-to-Eat Cereal Industry," *RAND Journal of Economics*, Vol. 31, No. 3, 2000, pp. 395-421, at pp. 404-408.

<sup>764</sup> Hausman, Jerry A., "Valuation of New Goods under Perfect and Imperfect Competition," in *The Economics of New Goods*, Vol. 58, Studies in Income and Wealth, Eds. Timothy F. Bresnahan and Robert J. Gordon, Cambridge, MA: National Bureau of Economic Research, 1996, pp. 209-247, at p. 210.

<sup>765</sup> Brownstone, David and Kenneth Train, "Forecasting new product penetration with flexible substitution patterns," *Journal of Econometrics*, Vol. 89, 1999, pp. 109-129, at p. 116.

choose a different model that would allow me to better capture substitution patterns between the individual products at issue and their closest rivals.

382. However, the question at hand in this case is very different. I am studying Google's operation of a platform with literally millions of apps, with apps entering and exiting over multiple years. These characteristics are more characteristic of macroeconomics and international trade than merger-focused analysis. Dr. Leonard claims that the systems based on Berry, Levinsohn, and Pakes (1995) "are the most commonly used in empirical economics research today."<sup>766</sup> I disagree with this statement. These systems are commonly used in industrial organization, and those are the examples he cites, but these systems are applied only sporadically in other subfields of economics. The level of detail in this kind of analysis is often inappropriate for questions about interactions among a very large numbers of firms, such as on the Google Play Store.

383. As I mention above, better models for studying the Google Play Store are models in spirit of Eaton and Kortum (2022) and Hsieh et al (2009), which study trade and macroeconomics. Such papers model interactions across many firms and the resulting economic phenomena. These papers do not attempt to model heterogeneous substitution patterns among millions of firms, but rather use a CES model with a single substitution parameter to address industries much broader than the one I address. Dr. Leonard provides no empirical evaluation of whether abstracting away from heterogeneous substitution patterns does or does not create issues. Dr. Leonard also does not address that this kind of abstraction is widely considered to be acceptable in important empirical papers that are similar to the Google Play Store question in important ways.

384. One implication of IIA is that it is possible for such models to overstate welfare gains from new products. I have co-authored a paper – Akerberg and Rysman (2005) – directly

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<sup>766</sup> Leonard Report, footnote 76.

on this topic, and I brought those concerns to this analysis.<sup>767</sup> Intuitively, an interpretation and example of the potential issue is that new products could crowd out existing products in a retail store or a shelf space, and if this is an issue, then we show in the paper how to account for this.<sup>768</sup> It is important to recognize that whether this issue is material is an empirical question. It is not guaranteed to be a problem, and some papers show that the issue is not important in their analysis.<sup>769</sup> In my original report, I address this issue in two ways. Akerberg and Rysman (2005) is written mostly in terms of the logit model rather than the CES model, but we can still apply the paper's recommendations. First, Akerberg and Rysman (2005) recommend controlling for the number of products in the market in estimation.<sup>770</sup> This would mean controlling for the number of apps on the Google Play Store in a given month. However, I use month-fixed effects, which naturally controls for the number of apps in a month. Thus, the main estimation recommendation from Akerberg and Rysman (2005) is already accounted for.

385. Second, I have made conservative assumptions regarding elasticities. The problem might arise in the calculation of damages.<sup>771</sup> When we compute the quantity expansion from reducing Google's commission to the but-for rate, the issue of crowding implies that we might overstate the quantity increase and thus overstate the welfare gain. I insulate myself from this criticism by using a very conservative market wide elasticity, which reduces the quantity increase that results from reducing the commission rate. In particular, I use an elasticity of one,

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<sup>767</sup> Akerberg, D. A. and Rysman, M., "Unobservable product differentiation in discrete choice models: Estimating price elasticities and welfare effects," *RAND Journal of Economics*, Vol. 36, No. 4, 2005, pp. 771-788 (hereafter "Akerberg and Rysman (2005)").

<sup>768</sup> Akerberg and Rysman (2005), p. 773.

<sup>769</sup> For example, Gowrisankaran and Rysman (2012) test for crowding in the spirit of Akerberg and Rysman (2005) and find that the issue is not important: "[f]inding a coefficient of zero implies that the logit model is well specified, whereas a coefficient of -1 implies 'full crowding,' so there is no demand expansion effect from variety." See Gowrisankaran, Gautam, and Marc Rysman, "Dynamics of Consumer Demand for New Durable Goods," *Journal of Political Economy*, Vol. 120, No. 6, 2012, pp. 1173-1219, at p. 1197.

<sup>770</sup> Akerberg and Rysman (2005), p. 773.

<sup>771</sup> Not addressing crowding in the SSNIP is actually conservative. As the hypothetical monopolist imposes a higher commission, app prices increase, which leads to a reduction in the quantity transacted and a reduction in the number of apps on the market. If crowding were a concern, less apps would mean less crowding, which would increase the quantity transacted relative to the no-crowding benchmark, which makes the hypothetical monopolist more profitable.

which is more inelastic than what I find for the market-wide elasticity in my original report. My results are conservative even if crowding is present, as long as the level of crowding is not so great as to reduce the elasticity below one. Overall, the concerns in Akerberg and Rysman (2005) appear to be unimportant for my model.

3. *Dr. Leonard's criticism of Ghose and Han (2014) Elasticity Estimate is Redundant*

386. Dr. Leonard criticizes the own-price elasticity of demand estimate that I use from the Ghose and Han (2014) paper.<sup>772</sup> However, he fails to recognize that I have used that elasticity to be conservative as it represents *an* upper bound on my elasticity estimate based on my regression work. I could have used my elasticity estimate which would be less conservative. Indeed, I show that damages based on my estimate of elasticity are much higher than damages based on the Ghose and Han (2014) elasticity estimate.<sup>773</sup> Dr. Leonard suggests using an adjusted Ghose and Han (2014) elasticity.<sup>774</sup> However, I do not see a reason for making the elasticity estimate even more conservative given the results of my regression work.<sup>775</sup>

387. In any case, Dr. Leonard's criticism of Ghose and Han (2014) and its applicability to this matter is flawed. For example, Dr. Leonard claims that I overestimate elasticity by using the Ghose and Han (2014) elasticity: "Dr. Rysman's extrapolation of the elasticity for the top 400 paid apps to all paid apps is flawed."<sup>776</sup> His calculations are incorrect. First, he makes a misleading claim that "in the context of Dr. Rysman's model where apps all have the same quality, the top 400 apps could have higher share only by having a lower price."<sup>777</sup> As I have explained elsewhere, the homogenous quality assumption in my damages model is an abstraction and, as I have explained, Dr. Leonard's interpretation of the assumption is too literal. Indeed, in

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<sup>772</sup> Leonard Report, Appendix E, ¶¶ 4-7.

<sup>773</sup> See Rysman Rebuttal Report Backup Production.

<sup>774</sup> Leonard Report, Appendix E, ¶ 6.

<sup>775</sup> Although, for the sake of comparison, I also run my damages model using Dr. Leonard's proposed elasticity estimate. See Rysman Rebuttal Report Backup Production.

<sup>776</sup> Leonard Report, Appendix E, ¶ 5-6.

<sup>777</sup> Leonard Report, Appendix E, ¶ 6.

my regressions I explicitly use heterogeneity across the apps by controlling for app quality and other fixed effects. Hence, my demand model and my elasticity estimate are consistent with and account for ex-post heterogeneity. Thus, Dr. Leonard's calculations based on the premise that the top 400 apps could have higher share only by having a lower price is wrong because the premise itself is wrong.

388. Finally, Dr. Leonard questions the validity of the instruments used by Ghose and Han (2014) based on the arguments in Armstrong (2016).<sup>778</sup> However, Armstrong's criticism is unlikely to apply. Armstrong is concerned with a largely theoretical point that as the number of products in a market goes to infinity (that is, the "Large Market Asymptotics" in the title), price-cost margins ("markup") tend to a constant term, and then, instruments based on shifters of the price-cost margin no longer apply.<sup>779</sup> However, Ghose and Han study a market with 400 paid apps. 400 is a lot less than infinity.<sup>780</sup> Moreover, there is no claim that all apps on the Play Store have the same margins. Personally, I view Armstrong's criticism as a largely theoretical point about asymptotics (*i.e.*, pertaining to situations in which the number of products goes to infinity) rather than a criticism of any applied work.

**I. Dr. Leonard Asserts That There Would Be Increased Costs to Developers and Consumers in the But-For World and Provides Two Theoretical Models That Do Not Fit the Facts of the Case**

389. Dr. Leonard asserts that consumers and developers would face higher costs in the but-for world. For consumers, these costs might have been (1) higher search costs to find apps;

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<sup>778</sup> Leonard Report, Appendix E, footnote 5.

<sup>779</sup> Armstrong, Timothy B., "LARGE MARKET ASYMPTOTICS FOR DIFFERENTIATED PRODUCT DEMAND ESTIMATORS WITH ECONOMIC MODELS OF SUPPLY," *Econometrica*, Vol. 84, No. 5, 2016, pp. 1961-1980, at pp. 1961 and 1969.

<sup>780</sup> This is still the case even with the additional 400 free apps. *See* Ghose and Han (2014), p. 1471. Armstrong also conducts Monte Carlo Simulations where he shows that the number of "markets" (*e.g.*, number of geography x time periods in the data) is also important to determine how well BLP instruments perform. When the number of markets is large enough relative to the number of products, the instruments perform better. For example, in one of his simulations, he considers 20 markets and 100 products per market. *See* Armstrong (2016), pp. 1976-1977. In Ghose and Han (2014), there are about 120 "markets" as they use daily data over four months. *See* Ghose and Han (2014), p. 1473.



(2) for apps that exhibit direct network effects (value of an app increasing with number of other consumers using the app), in the but-for world, the number of consumers consuming each such app could have been lower and hence each consumer would get less value from consuming such apps. For developers, these might have been costs associated with multi-homing related to separate app store applications, negotiations, and others.<sup>781</sup>

390. Dr. Leonard’s main support for his claims with regard to higher costs to consumers in the but-for world are two theoretical models that he offers in Appendix E of his report. These models generate different welfare results than the model I propose. Dr. Leonard provides no reason to think his models better fit the data or facts of the case than my model, and he provides no empirical validation of his models. I discuss below how his models match the case poorly, particularly in regard to the main issues his models are meant to address. His main goal does not seem to be to develop realistic models but rather to show that different models than the one I propose would generate different results. However, there is no dispute on the point that alternative models that do not fit the facts at hand would find different results. Accepting this point does not undercut my results and, to the contrary, strengthens my confidence in my results.

391. In what follows, I explain why Dr. Leonard’s models and criticisms are speculative and contrary to the facts of the case.

*1. Dr. Leonard’s Direct Network Effects Model is Arbitrary and Its Implications Are Not Supported by Facts of This Case*

392. Dr. Leonard asserts that for “many” apps “the value of the app to a consumer increases with the number of other consumers that use the app.”<sup>782</sup> He claims that such apps could have been less valuable to consumers in the but-for world because fewer people could be consuming each such app in the but-for world. He provides a model to illustrate his point.<sup>783</sup>

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<sup>781</sup> Leonard Report, ¶¶ 158-161.

<sup>782</sup> Leonard Report, ¶ 160.

<sup>783</sup> Leonard Report, ¶ 160 and Appendix E, § IV.

393. Dr. Leonard does not provide any evidence to support his claims, nor does he provide any support for his model from the literature. Certainly, he does not provide an estimate of the parameter that he introduces in his model with direct network effects. In this sense, his model is just a theoretical comparative static.

394. He adjusts my model to account for within-app network effects. In his model, the utility that any consumer obtains from an app goes up in the quantity of purchases made by other consumers of that app. As the variety of apps increases, the quantity of purchases at each app can decrease, which dissipates network effects. In addition, Dr. Leonard argues that one would need to compensate less to consumers because “a given increase in budget in the actual world would have led to more expenditure on the apps that existed in the actual world and thus more usage of those apps. This increase in usage would, through the direct network effects, increase the quality of the apps that existed in the actual world, and the higher app quality would have benefited consumers.”<sup>784</sup>

395. There are numerous criticisms one could make of his approach. For instance, most models of network effects distinguish between a stand-alone effect of the product and the network effect.<sup>785</sup> The stand-alone value is the value if no one else used the app. In a game, it would be the value of playing against the computer. The network effect captures the value when other people use the game. In Dr. Leonard’s model, there is only the network effect and no standalone effect, which is unrealistic.<sup>786</sup> Also, his approach relies heavily on the quantity of transactions being the same across all apps. As discussed in my report, I use that as an abstraction that allows me to focus on the main issues of the case, and it obviously is not meant to be an important prediction of the model. By emphasizing this point, he is taking my model out

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<sup>784</sup> Leonard Report, Appendix E, ¶ 22.

<sup>785</sup> See for example, Katz, Michael L. and Carl Shapiro, “Network Externalities, Competition, and Compatibility,” *The American Economic Review*, Vol. 75, No. 3, 1985, pp. 424-440, at p. 426.

<sup>786</sup> There may exist apps where almost all of the value comes when other people use it, such as for communication apps like Facebook, Snapchat, and Whatsapp. However, these apps are often completely free, and thus, less important for my analysis, which emphasizes apps subject to Google’s commission. In contrast, games and other apps typically have an important stand-alone benefit.

of context and using it in unintended ways. In the but-for world, I expect consumers to gravitate to the best apps, and having more variety gives consumers more opportunities to realize better apps. The fact that I do not provide an explicit model of this process simplifies my analysis but is still captured by my variety model in the sense that the utility of Android goes up in the number of unique apps even when I conservatively assume that spending does not go up in the but-for world.

396. But by far, the biggest problem with Dr. Leonard's network effect model is that there is no evidence that the effect he describes actually matters. If the mechanism that Dr. Leonard presents was important, Google would want less variety rather than more variety of apps in order to concentrate consumer usage on a few apps, have the apps realize higher levels of network effects, enhance consumer welfare, and then to presumably extract more revenue. That clearly contradicts the testimony we have in this case from Google executives and experts. For example, Eric Chu, former Engineering Director at Google, testified that Google's goal was to attract developers, so that more consumers would join Android. Chu stated that more apps meant more utility to users, and that more utility attracts more users, which in turn attracts more developers.<sup>787</sup> Even if the within-app network that Dr. Leonard proposes were of only moderate importance, Google would still have an incentive to reduce the variety of apps from the free entry equilibrium, but I am not aware of a claim that Google engages in this behavior at all or ever even considers this issue. Apple and Google engage in some curation of the apps on their stores, but even in this case, it is more about filtering out low-quality apps.<sup>788</sup> I am not aware of Apple or Google restricting entry in order to concentrate usage on fewer apps to take advantage of within-app network effects. It is unclear why Dr. Leonard proposes this as a useful model, and in fact, he never claims that the model fits the facts of the case better than my model, and it clearly does not.

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<sup>787</sup> Chu (Google) Deposition, at pp. 94-95.

<sup>788</sup> Condon, Stephanie, "Tim Cook: Without Apple curation, App Store would be a 'toxic mess,'" *ZDNET*, May 21, 2021, available at <https://www.zdnet.com/article/tim-cook-without-apple-curation-app-store-would-be-a-toxic-mess/> and Geeksforgeeks, "Google Play Protect: How it Detects and Removes Malicious Apps?" June 7, 2019, available at <https://www.geeksforgeeks.org/google-play-protect-how-it-detects-and-removes-malicious-apps/>.

2. *Dr. Leonard's Search Cost Model is Not Supported by Facts of This Case*

397. Dr. Leonard claims that search costs for consumers would increase in the but-for world which would be an offset to damages. The reason is that “one would expect that consumers would have had to spend more time searching to identify the set of apps to download to their phones.”<sup>789</sup> He provides a model to illustrate his point,<sup>790</sup> based on Anderson and Renault (1999).<sup>791</sup> In this model, consumers search for a product from a given number of products. They search sequentially and in a fixed order of products.<sup>792</sup> Dr. Leonard claims that “the variety effect in this model would be negligible as long as the large majority of consumers reach their optimal stopping point on app search short of  $n$  in the actual world. For such a consumer, increasing  $n$  in the but-for world would have no effect on their welfare (holding app prices constant); that is, there is no significant ‘variety’ effect in this model.”<sup>793</sup> Dr. Leonard does not provide any empirics about how many apps consumers search across when choosing an app, but suppose the number is 100, which I think is a conservatively high choice. In Dr. Leonard’s model then, consumers put no value on the number of apps in an operating system beyond 100. That runs counter to evidence in this case. The Google Play Store had over three million apps, and the Amazon Store, which Google deemed too small to compete with the Play Store, still had about half a million apps.<sup>794</sup> Google’s experts and I agree that variety is a value-add for app stores.<sup>795</sup> Dr. Leonard offers no explanation or support for why his model might be a reasonable description of the case at hand, and seems clear that it is not. Dr. Leonard also does not provide

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<sup>789</sup> Leonard Report, ¶ 159.

<sup>790</sup> Leonard Report, Appendix E, ¶¶ 15-20.

<sup>791</sup> Anderson, Simon P. and Regis Renault, “Pricing, product diversity, and search costs: A Bertrand-Chamberlin-Diamond model,” *RAND Journal of Economics*, Vol. 30, No. 4, 1999, pp. 719-735 (hereafter “Anderson and Renault (1995)”).

<sup>792</sup> Anderson and Renault (1995), pp. 721-723.

<sup>793</sup> Leonard Report, Appendix E, ¶ 20.

<sup>794</sup> FinancesOnline, “Number of Apps in Leading App Stores in 2022/2023: Demographics, Facts, and Predictions,” November 6, 2022, available at <https://financesonline.com/number-of-apps-in-leading-app-stores/>.

<sup>795</sup> See, e.g., Tucker Report ¶¶ 214-16.

an estimate of the parameter that he introduces in his model. In this sense, his discussion is just a theoretical comparative static.

398. Consumers do not search blindly, as is the case in Dr. Leonard’s model. The Google Play Store provides discoverability features, and this helps consumers to find more relevant apps when more apps are available.<sup>796</sup> In addition, apps also have effective ways to reach consumers. Indeed, one source that Dr. Leonard cites states that “[1] [t]he empirical results show that consumers prefer more diversified apps when they are making download decisions... which is supported by the psychology literature on people’s variety seeking behavior... [2] developers are actively exploring various user acquisition channels, including mobile display ads... purchased downloads... price promotions... and search ads... [3] CP [cross-promotion] has been successfully implemented in the industry.”<sup>797</sup>

399. Indeed, Dr. Tucker has opined that “[t]he Google Play store creates value for the Android ecosystem by reducing search costs for users and developers to find one another... [t]o do so, Google helps developers increase their apps’ ‘discoverability’ by interested users... Google also supports users’ ability to find the apps that most closely match users’ needs—for example, by improving algorithms to create personalized recommendations and continually

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<sup>796</sup> Google, “Get Discovered on Google Play Search,” available at <https://support.google.com/googleplay/android-developer/answer/4448378?hl=en> and Google, “How Google Play Works,” available at <https://play.google.com/about/howplayworks/> (noting that “Google Play makes it easy to discover high-quality apps and games...Ensuring a positive experience when navigating Google Play means making it easy to find the apps our users know and love as well as new and undiscovered titles. The Play Store gives users a variety of ways to discover the right apps, like browsing our most popular apps, searching for a specific title, or viewing recommendations.”).

<sup>797</sup> Lee, Gene Moo, Shu He, Joowon Lee, and Andrew B. Whinston, “Matching Mobile Applications for Cross-Promotion,” *Information Systems Research*, Vol. 31, No. 3, 2020, pp. 865-891, at pp. 865-866; Tapjoy website describes it as follows: “[a]dvertisers place ads with Tapjoy, and Tapjoy shows those ad offers to you, the user, in advertising space in participating publishers’ apps. When you complete the ad offer, the advertiser notifies Tapjoy so we can reward you. Tapjoy rewarded advertising allows users like you to be rewarded for their time and attention, publishers to earn money through their apps, and advertisers to reach users who may be interested in their products and services.” See Tapjoy, “What Is Tapjoy?” available at <https://www.tapjoy.com/faqs/what-is-tapjoy/#:~:text=Advertisers%20place%20ads%20with%20Tapjoy,so%20we%20can%20reward%20you.>

improving store design to allow for improved navigation.”<sup>798</sup> It is not clear why Dr. Leonard claims that the search costs are important and would increase in the but-for world. Indeed, if anything, one would think that Google and other market participants (*e.g.*, developers) would have even stronger incentives to improved discoverability in the but-for world.

3. *Dr. Leonard Purports Increased Costs to Developers in The But-For World Without Providing Any Evidence*

400. Dr. Leonard claims that “[d]evelopers who would have multi-homed in the but-for world would have incurred additional costs related to separate app store applications, negotiations, different compliance requirements, different versions of Android systems (especially if that means different programming languages or substantively different versions of the same programming languages need to be used), among others.”<sup>799</sup>

401. Dr. Leonard does not support his claim with any evidence. In fact, as I noted in my Opening Report, Google’s conduct prevented independent app stores from scaling an opensource, cross-app store in-app billing solution called “OpenIAB.” If realized, the OpenIAB mechanism would have helped resolve the fragmentation issue with respect to the in-app billing mechanism.<sup>800</sup> In addition, in Section V.G above, I show why Dr. Gentzkow’s claim that Google’s challenged conduct resolves fragmentation fails to recognize important evidence in the case.

**J. Dr. Leonard’s Criticisms Do Not Alter My Damages Assessment**

402. Dr. Leonard’s criticisms do not alter my damages assessment. His criticisms are based on arguments that are generally unfounded and based on either flawed or equivocal intuition. In addition, his models are not based on the facts of this case.

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<sup>798</sup> Tucker Report, ¶ 106; she also cites an email from Ankit Jain to Play Recommendations et al., “Launched: Personalized Recommendations for Google Play!,” June 28, 2012, GOOG-PLAY-002863312-313 (stating that “Yesterday, the Android Search & Recommendations team launched v1 of Google Play Personalized Recommendations. ... We have some level of personalization for over 900M users at launch!”).

<sup>799</sup> Leonard Report, ¶ 161.

<sup>800</sup> Rysman Opening Report, ¶ 521.

403. Dr. Leonard misrepresents my benchmarking method for but-for commission and repeatedly states that, in my model, I have assumed a 100% pass-through rate, which is incorrect. His own damages quantifications completely ignore any effect of Google's anticompetitive conduct on consumers through variety and he does not even attempt to propose a "corrected" version of my variety damages quantification.

404. Dr. Leonard also criticizes my damages model claiming that it is stylized and based on unrealistic assumptions. His criticism mostly stems from speculation and equivocal intuition and misses the fundamental point that economic models set aside immaterial details and focus on the most important aspects that pertain to a given question under consideration. He also does not acknowledge the many conservative assumptions that I impose. Finally, Dr. Leonard's baseless criticism that my damages model does not account for consumer search costs and direct network effects is without merits and does not fit the facts of this case.

405. As I have explained in my Opening Report, to assess the harm to consumers caused by Google's anticompetitive and exclusionary conduct, I developed a model of monopolistic competition between apps, based on Church and Gandal (1993), in which developers supply apps and in-app content and compete on prices charged to consumers. I used the model to calculate the effects that a lower commission and more Play Points would have had, but for Google's anticompetitive conduct, on consumers' welfare, including a direct effect, a welfare effect through increased varieties/apps, as well as a combined total effect.

406. I provided several measures of welfare effects that variously hold entry constant, hold prices constant, or allow for a total effect on consumer welfare in response to Google's high commissions and low discounts. While the total welfare effect accounts for all of the economic effects of the high commissions and low discounts, to be conservative I took the minimum of the total welfare effects and variety effects, where, in the latter, I hold the price constant, (i.e., no changes in app pricing in response to commission changes), to arrive at my proposed damages. I found total damages in the Android App Distribution and In-App Billing Services Markets of roughly [REDACTED] for the period August 16, 2016, to June 5, 2023 ("the damages period") for consumers in the Plaintiff States. I also used the model to calculate damages associated with the tie of Android in-app billing services only, which I found to be approximately [REDACTED].



## VII. Conclusion

407. Based on my review of the reports Google submitted, my analyses presented in this report and those summarized in my Opening Report, my review of the record, and my experience as an industrial organization economist, it remains my opinion that Google has engaged in anticompetitive conduct that caused harm to competition and harmed Android smart mobile device users in the U.S. and worldwide (excluding China).

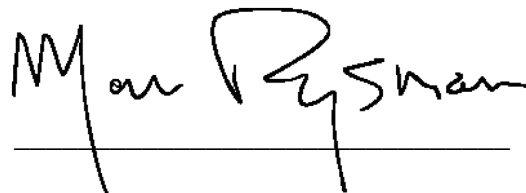
408. I find the opinions of Google’s consultants flawed and unconvincing. Dr. Tucker errs in focusing on the entire Android ecosystem, which leads her to define an overly broad and vague relevant product market consisting of “facilitation of digital transactions” and mistakenly conclude that Google does not have market power. She mistakes limited substitution away from Android smart mobile devices to other platforms in the actual world, in which Google has exercised its market power, as evidence of substitution in a counterfactual world. In failing to compare Google’s actual world commission, output, and innovation with an appropriate competitive benchmark, her claims regarding Google’s commission, output, and innovation are uninformative.

409. Dr. Gentzkow’s analysis of Google’s conduct relies on standards that would likely find very little conduct anticompetitive. He mistakenly considers each part of Google’s challenged conduct (and each type of contract) separately, failing to recognize the collective impact of Google’s conduct and ignoring that Google itself considered the collective impact of the various elements of its challenged conduct. His claim that the “availability” of alternative app distribution channels is sufficient to find there is no harm to competition is not grounded in antitrust principles and ignores the extent to which these channels, even when available, were disadvantaged by Google’s conduct. His five-factor test to demonstrate that Google’s “price” is “effective” appears designed to fit the facts of Google’s conduct and conflates “effective” with “competitive,” and Dr. Gentzkow fails to recognize that monopolists could satisfy certain of his factors.

410. Dr. Leonard misunderstands and/or mischaracterizes my damages model. He misrepresents my benchmarking methodology for the but-for commission of 15%, incorrectly claims my model assumes 100% pass-through, and mistakenly contends my model fails to

account for heterogeneity across apps and uses simplifying assumptions for the sake of analytical tractability. Moreover, Dr. Leonard's proposed adjustments to my model do not fit the facts of this case.

411. Finally, while Google's consultants may criticize details of how I implemented my analyses, there is no dispute about the basic idea that, in general, economics provides valid methods and tools for my calculations. Therefore, I continue to find that Google (i) holds market power in two relevant antitrust markets, each of which is pertinent to evaluating the effects of Google's challenged conduct, (ii) engaged in a combined course of anticompetitive conduct through which it restricted competition by imposing barriers in each Android app distribution channel and maintained market power in the market for Android App Distribution, (iii) tied the use of Google Play Billing to its app distribution services, and, through this collective challenged conduct, (iv) caused harm to competition and consumers.

A handwritten signature in black ink, reading "Marc Rysman". The signature is written in a cursive, flowing style. Below the signature is a horizontal line.

Marc Rysman, Ph.D.

December 23, 2022

**Appendix A**  
**Curriculum Vitae of Marc Rysman**

**MARC RYSMAN**

Department of Economics  
Boston University  
270 Bay State Road  
Boston, MA 02215

mrysman@bu.edu  
sites.bu.edu/mrysman/  
(617) 353-3086 (office)

**EDUCATION**

Ph.D. Economics, University of Wisconsin-Madison

B.A. Economics, Columbia University

**PRIMARY ACADEMIC APPOINTMENTS**

Professor, Boston University, 2011 to present

Associate Professor, Boston University, 2006 to 2011

Assistant Professor, Boston University, 1999 to 2006

**VISITING POSITIONS**

Visiting Scholar, Center for Consumer Payments Research, Federal Reserve Bank of Boston, 2009-2019

Visiting Scholar in Economics, Harvard University, 2014-2015

Visiting Associate Professor, Economics Department, Massachusetts Institute of Technology, 2007-2008

Visiting Scholar in Economics, Harvard University, 2003-2004

Visiting Fellow, Center for Studies in Industrial Organization, Northwestern University, May-June 2003

Visiting Scholar, Federal Reserve Bank of Minneapolis, July 2003

Research Assistant, Brookings Institution, 1992-1994

**EDITORIAL POSITIONS**

Editor, RAND Journal of Economics, 2014-2020

Editor, Review of Network Economics, 2010-2015

Associate Editor, Journal of Industrial Economics, 2010-2014

Associate Editor, The RAND Journal of Economics, 2007-2014

Associate Editor, International Journal of Industrial Organization, 2005-2014

Co-editor, Journal of Economics and Management Strategy, 2007-2010

**OTHER PROFESSIONAL SERVICE**

Advisory Committee on Interoperable Payment Systems Project for Innovations for Poverty Action, 2022

Program Committee for Asia-Pacific Industrial Organization Conference, December 2021

Scientific Committee for Online Seminar on the Economics of Platforms, Toulouse School of Economics, 2020 to present

Faculty affiliate to the Rafik B. Hariri Institute for Computing and Computational Science & Engineering, Boston University

Faculty affiliate to the Center for Innovation in Social Sciences, Boston University

Sponsorships, Industrial Organization Society, 2022

Secretary, Industrial Organization Society, 2018 to present

President, Industrial Organization Society, 2016-2017

Vice-President, President-Elect of Industrial Organization Society, 2014-2015

Academic Panel Member, Competition and Markets Authority, United Kingdom, 2016-2020

Organizing Committee, International Industrial Organization Conference 2008-2014

Organizer, Standards, Innovation and Patents Conference in Tucson. Sponsored by the NBER and USPTO. February 2012. Editor for special issue in IJIO

Organizing Committee, European Association for Research in Industrial Economics (EARIE) conference, Stockholm, 2011

Local Organizer, Summer Meetings of the North American Econometric Society, Boston University, 2009

#### **UNIVERSITY SERVICE**

Chair of the Department of Economics, 2020- present

Associate Chair of the Department of Economics, 2017-2020

Department Liaison to the Scientific Computing and Visualization Center, 2012- 2016

Merit and Equity Advisory Committee, 2001, 2002, 2009, 2014, 2016, 2019

Advisor to Second-year Graduate Students, 2013-2014, 2008-2009

Director, Junior Recruiting Committee, 2006-2007, 2009-2010, 2013-2014

Department newsletter, 2013

Chair, Academic Promotion and Tenure, College of Arts and Sciences, 2012-2013

Academic Promotion and Tenure, College of Arts and Sciences, 2011-2012

Discussion Facilitator in the Program in Responsible Conduct of Research for Graduate Students and Postdoctoral Researchers on March 31, 2011

College Teaching Prize Committee, Spring, 2011

Committee on Conflicts of Interest, 2008-2011

Co-director, Junior Recruiting Committee 2000-2001

Social Science Curriculum Committee, 2005-2007

Representative to CAS Reg-Prep (Registration Preparation)

Acting Director, Industry Studies Program, 2001-2002, 2009-2010

Summer Orientation Academic Advising, 2001, 2002, 2004, 2005

Junior Recruiting Committee 1999-2005

Undergraduate Studies Committee 1999-2005

### **INVITED LECTURES (SELECTED)**

“Empirics of Network Effects,” Plenary Talk, Conference on “Digital Platforms: Opportunities and Challenges,” Toulouse School of Economics, October, 2020.

Panel on “The Current Economic Understanding of Multi-Sided Platforms,” Competition and Consumer Protection Hearings, organized by the Federal Trade Commission at George Mason Law School, October, 2018.

“Antitrust in Digital Industries,” Public Lecture organized by the Japanese Federal Trade Commission, Tokyo, March, 2014.

“Estimating Price-Cost Margins in a Dynamic Environment,” Invited Lecture, European Association for Research in Industrial Economics (EARIE), Munich, September 2015.

“Payment Networks,” Academic Consultants Conference for the members of the Board of Governors, Federal Reserve Bank, October 2011.

“Estimating Network Effects in a Dynamic Environment,” Invited Lecture, European Association for Research in Industrial Economics (EARIE), Stockholm, September 2011.

“Adoption and Use of Payment Instruments by US Consumers,” Keynote speech at conference entitled Payments Markets: Theory, Evidence and Policy, Granada, Spain. June, 2010.

“Platform Pricing at Sportscard Conventions,” Plenary speech at conference entitled Platform Markets: Regulation and Competition Policy. Mannheim, Germany, May, 2010.

“Empirical Analysis of Payment Card Usage,” Plenary session at Conference on Two-Sided Markets, Institut D’Economie Industrielle, Toulouse, January 2004.

### **INVITED SHORT COURSES**

“Two-Sided Markets: From Theory to Empirics and Applications,” Shanghai University of Finance and Economics, June 2017.

“Static and Dynamic Demand Estimation,” for joint PhD program among Berlin universities, August 2014.

“Network Effects, Two-Sided Markets and Standard Setting,” Fordham Competition Law Institute Training for Agency Economists. (I taught one section of a week-long training for competition authority economists from many countries.) June, 2007-June, 2013.

“Structural Econometrics in Industrial Organization,” Hitotsubashi University, February 2009.

**PUBLICATIONS**

- Leong, K., Li, H., Rysman, M., and Walsh, C. (2022). Law enforcement and bargaining over illicit drug prices: Structural evidence from a gang's ledger. *Journal of the European Economic Association*, 20:1198–1230.
- Rysman, M. and Schwabe, R. (2021). Platform competition and the regulation of stock exchange fees. *Concurrences Competition Law Review*, (4):27–33.
- Jullien, B., Pavan, A., and Rysman, M. (2021). Two-sided markets, pricing, and network effects. In Ho, K., Hortacsu, A., and Lizzeri, A., editors, *Handbook of Industrial Organization*, volume 4, chapter 7, pages 485–592. Elsevier.
- Celiktemur, C., Klein, A., Rysman, M., and Mani, V. (2021). Taming gatekeepers - but which ones? *Competition Policy International*.
- Rysman, M., Simcoe, T., and Wang, Y. (2020). Differentiation in adoption of environmental standards: LEED from 2000-2010. *Management Science*, 66:4173–4192.
- Chiou, L., Kafali, E. N., and Rysman, M. (2020). Internet use, competition, and geographical rescoping in Yellow Pages advertising. *Information Economics and Policy*, 52. Article 100867.
- Chu, C. S. and Rysman, M. (2019). Competition and strategic incentives in the market for credit ratings: Empirics of the financial crisis of 2007. *American Economic Review*, 109:3514–3555.
- Rysman, M. (2019). The reflection problem in network effect estimation. *Journal of Economics and Management Strategy*, 28:153–158. Named *Management Science* Top 10 most downloaded paper over two years.
- Greene, C., Rysman, M., Schuh, S., and Shy, O. (2018). Costs and benefits of building faster payment systems: The U.K. experience. *Journal of Financial Transformation*, 47:51–66.
- Rysman, M. and Schuh, S. (2017). New innovations in payments. In Greenstein, S., Lerner, J., and Stern, S., editors, *Innovation Policy and the Economy*, volume 17, pages 27–48. University of Chicago Press.
- Falls, C., Friedman, P., and Rysman, M. (2016). The impact of the internet on distribution. In Banks, T., Langenfeld, J., and Wittrock, Q., editors, *Antitrust Law and Economics of Product Distribution*, chapter 10, pages 475–495. American Bar Association, second edition.
- Rysman, M. (2016). Empirics of business data services. Appendix B of *Business Data Services Federal Notice of Proposed Rulemaking*, FCC 16-54.
- Koulayev, S., Rysman, M., Schuh, S., and Stavins, J. (2016). Explaining adoption and use of payment instruments by US consumers. *RAND Journal of Economics*, 47:293–325.
- Jin, G. and Rysman, M. (2015). Platform pricing at sports cards conventions. *Journal of Industrial Economics*, 63:704–735.
- Rysman, M. and Wright, J. (2014). The economics of payment cards. *Review of Network Economics*, 13:303–353.

- Rysman, M. (2013). Exclusionary practices in two-sided markets. In Hawk, B. E., editor, *Proceedings of the 39th Fordham Competition Law Institute International Conference on Antitrust Law and Policy*, pages pp. 537–564, New York. Juris.
- Gowrisankaran, G. and Rysman, M. (2012). Dynamics of consumer demand for new durable goods. *Journal of Political Economy*, 120:1173–1219.
- Rysman, M. and Simcoe, T. (2011). A NASTY alternative to RAND pricing commitments. *Telecommunications Policy*, 35:1010–1017.
- Crowe, M., Rysman, M., and Stavins, J. (2010). Mobile payments at the retail point of sale in the United States: Prospects for adoption. *Review of Network Economics*, 9.
- Mehta, A., Rysman, M., and Simcoe, T. (2010). Identifying the age profile of patent citations. *Journal of Applied Econometrics*, 25:1179–1204.
- De Stefano, M. and Rysman, M. (2010). Competition policy as strategic trade with differentiated products. *Review of International Economics*, 18:758–771.
- Rysman, M. (2010). Consumer payment choice: Measurement topics. In *The Changing Retail Payments Landscape: What Role for Central Banks? An International Payment Policy Conference*, pages 61–81. Federal Reserve Bank of Kansas City.
- Rysman, M. (2009). The economics of two-sided markets. *Journal of Economic Perspectives*, 23:125–144.
- Rysman, M. and Simcoe, T. (2008). Patents and the performance of voluntary standard setting organizations. *Management Science*, 54:1920–1934.
- Rysman, M. (2007a). Empirical analysis of payment card usage. *Journal of Industrial Economics*, 60:1–36.
- Rysman, M. (2007b). Empirics of antitrust in two-sided markets. *Competition Policy International*, 3:197–209.
- Greenstein, S. and Rysman, M. (2007). Coordination costs and standard setting: Lessons from 56k modems. In Greenstein, S. and Stango, V., editors, *Standards and Public Policy*, pages 123–159. Cambridge University Press.
- Rysman, M. and Simcoe, T. (2007). The performance of standard setting organizations: Using patent data for evaluation. *Journal of IT Standards and Standardization Research*, 5:25–40.
- Augereau, A., Greenstein, S., and Rysman, M. (2006). Coordination vs. differentiation in a standards war: 56k modems. *RAND Journal of Economics*, 37:887–909.
- Akerberg, D. A. and Rysman, M. (2005). Unobservable product differentiation in discrete choice models: Estimating price elasticities and welfare effects. *RAND Journal of Economics*, 36:771–788.
- Busse, M. and Rysman, M. (2005). Competition and price discrimination in Yellow Pages advertising. *RAND Journal of Economics*, 36:378–390.
- Rysman, M. and Greenstein, S. (2005). Testing for agglomeration and dispersion. *Economics Letters*, 86:405–411.



- Rysman, M. and Simcoe, T. (2005). Evaluating the performance of standard setting organizations with patent data. In Egyedi, T. and Sherif, M., editors, *Proceedings of the 4th International Conference on Standardization and Innovation in Information Technology*, pages 195–206, Geneva. IEEE.
- Rysman, M. (2004). Competition between networks: A study of the market for Yellow Pages. *Review of Economic Studies*, 71:483–512.
- Rysman, M. (2002). Review of the book: The economics of network industries, by Oz Shy. *Journal of Economic Literature*, 40:556–557.
- Rysman, M. (2001). How many franchises in a market? *International Journal of Industrial Organization*, 19:519–542.

## WORKING PROJECTS

- Rysman, M., Townsend, R. M., and Walsh, C. (2022). Branch location strategies and financial service access during the Thai financial crisis. Unpublished Manuscript, Boston University.
- Ho, C.-Y., Rysman, M., and Wang, Y. (2021). Demand for performance goods: Import quotas in the Chinese movie market. Unpublished manuscript, Boston University.
- Chen, M., Rysman, M., Wang, S., and Wozniak, K. P. (2020). Payment instrument choice with scanner data: An MM algorithm for fixed effects in non-linear models. Unpublished manuscript, Boston University.
- Gowrisankaran, G. and Rysman, M. (2020). A framework for modeling industry evolution in dynamic demand models. Unpublished Manuscript, Boston University.
- Rapson, D. S., Rysman, M., and Wang, S. (2020). The impact of the Zero Emissions Vehicles mandate on the California automobile market.
- Kaido, H., Li, J., and Rysman, M. (2018). Moment inequalities in the context of simulated and predicted variables. Unpublished manuscript, Boston University.
- McCalman, P. and Rysman, M. (2019). Airline services agreements: A structural model of network formation. Unpublished Manuscript, Boston University.
- Cohen, M., Rysman, M., and Wozniak, K. (2017). Payment choice with consumer panel data. Unpublished Manuscript.
- Gowrisankaran, G., Park, M., and Rysman, M. (2017a). Measuring network effects in a dynamic environment. Unpublished Manuscript, Boston University.
- Gowrisankaran, G., Rysman, M., and Yu, W. (2017b). Computing price cost margins in a durable goods environment. Unpublished Manuscript, Boston University.
- Rysman, M. (2003). Adoption delay in a standards war. Unpublished manuscript, Boston University.
- Rysman, M. (2000). Competition policy as strategic trade. Industry Studies Project Working Paper, #100, Boston University.

## **GRANT ACTIVITY**

“Estimation and Computation of Dynamic Oligopoly and Network Effects Models”, with Gautam Gowrisankaran. National Science Foundation, SES-0922629, 2009-2013.

“Dynamic Demand for New Durable Goods: An Empirical Model and Applications to Pricing and Welfare,” with Gautam Gowrisankaran. National Science Foundation, SES-0551348, 2006-2009.

“Discrete adjustment costs, investment dynamics, and productivity growth: Evidence from Chilean manufacturing plants”, with Simon Gilchrist. National Science Foundation, SES-0351454, 2004-2006.

“Empirical Studies of Network Effects”, National Science Foundation, SES-0112527, 2001-2002.

## **COURSES TAUGHT**

EC333 Market Organization and Public Policy (Antitrust and Regulation): Fall 1999, Fall 2000, Spring 2002-2003, Spring 2005-2011, Fall 2008-2011, Spring 2016, Spring 2020, Fall 2020.

EC732 Topics In Industrial Organization (Graduate Empirical IO): Spring 2000-2001, Fall 2001, Spring 2003, Fall 2004, Spring 2005-2013, Spring 2016-2022.

EC711 Topics in Econometrics: Spring 2010-2011.

EC709 Advanced Econometrics II: Fall 2006, Fall 2015, Fall 2017-2018.

EC201/303 Intermediate Microeconomics: Fall 2001, Fall 2002, Fall 2005.

EC903 Graduate Student Seminar: Fall 1999, Fall 2000.

## **HONORS AND AWARDS**

Neu Family Award for Teaching Excellence in Economics, 2006, 2012.

Networks, Electronic Commerce and Telecommunications (NET) Institute Grant, 2009.

Professor of the Year, 2006-2007, awarded by Boston University Fraternities and Sororities

Networks, Electronic Commerce and Telecommunications (NET) Institute Grant, 2005.

Networks, Electronic Commerce and Telecommunications (NET) Institute Grant, 2003.

Gerald M. Gitner Award for Excellence in Undergraduate Teaching, 2000.

Christensen Award in Empirical Economics, 1997 (with Phil Haile).

## **MEMBERSHIPS**

American Economic Association

International Industrial Organization Society

## TESTIMONY EXPERIENCE

- *Independent Living Resource Center of San Francisco, et al. v. Lyft, Inc.* (US District Court, Northern District of California, Case No. C-19-01438). Deposition in August 2020 and trial testimony in June 2021.
- *Twentieth Century Fox Film v. Wark Entertainment*, JAMS Ref. No. 1220052735. Deposition in June 2018 and trial testimony in August 2018.

## OTHER LITIGATION AND REGULATORY EXPERIENCE

- Retained as a testifying expert by performing rights organization in the determination of the allocation of retransmission fees by the Copyright Royalty Board, 2022.
- Retained as a testifying expert by music publishers for antitrust counterclaims in a copyright infringement case, January 2020.
- Retained as a testifying expert by banks in a foreign antitrust case involving payment cards, 2018-2019.
- Retained as a testifying expert in a confidential FRAND Arbitration, Hong Kong International Arbitration Centre, 2019.
- Retained as an expert in a group of antitrust cases in the high-tech sector involving FRAND and unilateral conduct issues, 2018.
- Wrote “Stock Exchanges as Platforms for Data and Trading,” for the New York Stock Exchange, which NYSE submitted to the SEC as part of a regulatory filing, December 2019. A follow-up report was filed in July 2020.
- Advocacy presentation to the Antitrust Division of the Department of Justice on a matter involving standard setting in a technology industry, March 2020.
- Wrote a white paper for the Federal Communication Commission studying market power in the business data services market, which influenced rulemaking: “Empirics of business data services.” Appendix B of Business Data Services Federal Notice of Proposed Rulemaking, FCC 1654, 2016.
- Commissioned to write and present a paper on interchange fee policy and its effect on competition in the payments card market to the members of the Board of Governors of the Federal Reserve Bank. The paper was entitled “Payment Networks,” and the event was formally titled as the “Academic Consultant’s Conference for the members of the Board of Governors.” September 2012. I presented directly to Chairman Bernanke, Vice Chairman Yellen and the rest of the Board of the Governors

## OTHER CONSULTING EXPERIENCE

- Academic Panel Member, Competition and Markets Authority, United Kingdom, 2016 to 2020. I was called on periodically to provide advice on CMA cases.
- Served as an academic consultant to the Consumer Payments Research Center at the Federal Reserve Bank of Boston 2009-2019.
- Served as a consultant to the Association of Directory Publishers in their advocacy to various state and municipal governments on the benefits of competition in the Yellow pages market, 2007.

**Appendix B  
Materials Relied Upon**

**I. Expert Reports**

- “Expert Report of Catherine E. Tucker,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Expert Report of Donna L. Hoffman, Ph.D.,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Expert Report of Douglas J. Skinner,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Expert Report of Dr. Gregory K. Leonard Errata,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 30, 2022.
- “Expert Report of Dr. Gregory K. Leonard,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Expert Report of Dr. Marc Rysman,” *State of Utah et al. v. Google LLC et al.*, Case No. 3:21-cv-05227, October 3, 2022.
- “Expert Report of Matthew Gentzkow,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Expert Report of Sandeep Chatterjee, Ph.D.,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Expert Report of Zhiyun Qian,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, November 18, 2022.
- “Merits Report of Hal J. Singer, Ph. D.,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, October 3, 2022.
- “Supplement to Initial Expert Report of Matthew Gentzkow,” *In re Google Play Store Antitrust Litigation*, Case No. 3:21-md-02981-JD, December 7, 2022.

## **II. Depositions and Associated Exhibits**

- Deposition of Aashish Patel, Director of Product Management at NVIDIA, September 29, 2022.
- Deposition of Adrian Ong, Senior Vice President of Operations at Match Group, February 24, 2021.
- Deposition of Anthony DiVento, Accounting Controller for Google Play at Google, September 8, 2022.
- Deposition of Ben Goodger, General Manager at Google, September 7, 2022.
- Deposition of Brian Vogelsang, Senior Director of Product Management at Qualcomm, November 10, 2022.
- Deposition of Christopher Babcock, Senior Platform Engineer at Epic Games, February 17, 2022.
- Deposition of Kaori Miyake, Head of Product Communications, Android and Google Play, November 1, 2022.

## **III. Data, Associated Documentation, and Correspondence**

- Google Monthly App Revenue Data  
GOOG-PLAY-009908837
- RSA Transactions Data  
GOOG-PLAY-011657415; GOOG-PLAY-011657416; GOOG-PLAY-011657417;  
GOOG-PLAY-011657418; GOOG-PLAY-011657419; GOOG-PLAY-011657420;  
GOOG-PLAY-011657421; GOOG-PLAY-011657422; GOOG-PLAY-011657423;  
GOOG-PLAY-011657424; GOOG-PLAY-011657425
- “IDC’s Worldwide Mobile Phone Tracker Taxonomy 2020”  
“IDC’s Worldwide Mobile Phone Tracker Taxonomy 2020”

**IV. Produced Documents**

- AMZ-GP 00002471
- AMZ-GP\_00003873
- AMZ-GP\_00005705
- GOOG-PLAY-000091853.R
- GOOG-PLAY-000094746
- GOOG-PLAY-000272539.R
- GOOG-PLAY-000289306
- GOOG-PLAY-000300552.R
- GOOG-PLAY-000314953.R
- GOOG-PLAY-000375525.R
- GOOG-PLAY-000565846
- GOOG-PLAY-000571373.R
- GOOG-PLAY-000571992
- GOOG-PLAY-000879069
- GOOG-PLAY-001442316
- GOOG-PLAY-001490474
- GOOG-PLAY-001507601
- GOOG-PLAY-001507602
- GOOG-PLAY-001507772
- GOOG-PLAY-001925008
- GOOG-PLAY-002432994.R
- GOOG-PLAY-002653755.R
- GOOG-PLAY-002863312
- GOOG-PLAY-003778936
- GOOG-PLAY-003894142
- GOOG-PLAY-004235367
- GOOG-PLAY-004453915
- GOOG-PLAY-004488106.R
- GOOG-PLAY-004537618
- GOOG-PLAY-004708826
- GOOG-PLAY-005535885
- GOOG-PLAY-005535888
- GOOG-PLAY-005570952.R
- GOOG-PLAY-005577045
- GOOG-PLAY-005705974.R
- GOOG-PLAY-006861555
- GOOG-PLAY-007203253
- GOOG-PLAY-007310413
- GOOG-PLAY-007335206
- GOOG-PLAY-007622187
- GOOG-PLAY-009209478
- GOOG-PLAY-009436873
- GOOG-PLAY-010547095
- GOOG-PLAY-010801633
- GOOG-PLAY-010801689
- GOOG-PLAY-010873444

- GOOG-PLAY-011461351
- GOOG-PLAY-011546624
- GOOG-PLAY-011607542
- GOOG-PLAY-011607543
- GOOG-PLAY-011607544
- GOOG-PLAY-011607545
- GOOG-PLAY-011640881
- NETFLIX-GOOGLE-00000019
- QCUTAH05227\_0000001
- SOUNDCLOUD\_000192
- SPOT-GOOGLE-00001105
- SEA Epic Production 000089

#### **V. Other Case Documents**

- Letter from Brian C. Rocca, Counsel for Defendants, to Melissa R. Coolidge, Counsel for Plaintiffs, October 8, 2021.

#### **VI. Articles, Books, and Public Documents**

- Ailawadi, Kusum L., Karen Gedenk, Christian Lutzky, and Scott A. Neslin, “Decomposition of the Sales Impact of Promotion-Induced Stockpiling,” *Journal of Marketing Research*, Vol. 44, No. 3, 2007, pp. 450-467.
- Anderson, Simon P. and Regis Renault, “Pricing, product diversity, and search costs: A Bertrand-Chamberlin-Diamond model,” *RAND Journal of Economics*, Vol. 30, No. 4, 1999, pp. 719-735.
- Armstrong, Timothy B., “Large market asymptotics for differentiated product demand estimators with economic models of supply,” *Econometrica*, Vol. 84, No. 5, 2016, pp. 1961-1980.
- Asker, John, “Diagnosing Foreclosure Due to Exclusive Dealing,” *The Journal of Industrial Economics*, Vol. 64, No. 3, pp. 375-410.
- Atkeson, Andrew and Ariel Burstein, “Aggregate Implications of Innovation Policy,” *Journal of Political Economy*, Vol. 127, No. 6, 2019, pp. 2625-2683.
- Ayres, Ian, “Rationalizing Antitrust Cluster Markets,” *Yale Law Journal*, Vol. 95, 1985, pp. 109-125.



- Bart, Nelly, et al., “Revenue-Sharing Contracts in Supply Chains: A Comprehensive Literature Review,” *International Journal of Production Research*, Vol. 59:21, No. 21, 2021, pp. 6633-6658.
- Berry, Steven, and Peter Reiss, “Empirical Models of Entry and Market Structure,” Chapter 29, *Handbook of Industrial Organization*, Vol. 3, 2007, pp. 1845-1886.
- Brownstone, David and Kenneth Train, “Forecasting new product penetration with flexible substitution patterns,” *Journal of Econometrics*, Vol. 89, 1999, pp. 109-129.
- Bulow, Jeremy I. and Paul Pfleiderer, “A Note on the Effect of Cost Changes on Prices,” *Journal of Political Economy*, Vol. 91, No. 1, 1983, pp. 182-185.
- Busso, Matias and Sebastian Galiani, “The Causal Effect of Competition on Prices and Quality: Evidence from a Field Experiment,” *American Economic Journal: Applied Economics*, Vol. 11, No. 1, 2019, pp. 33-56.
- Carlton, Dennis W. and Jeffrey M. Perloff, *Modern Industrial Organization*, Third Edition, Boston, MA: Addison-Wesley, 1999.
- Chetty, Raj, Adam Looney, and Kory Kroft, “Salience and Taxation: Theory and Evidence,” *American Economic Review*, Vol. 99, No. 4, 2009, pp. 1145-1177.
- Crane, Daniel A., “Does Monopoly Broth Make Bad Soup?” *Antitrust Law Journal*, Vol. 76, No. 3, 2010, pp. 663-676.
- Deaton, Angus and John Muellbauer, “An Almost Ideal Demand System,” *The American Economic Review*, June 1980, Vol. 70, No. 3, pp 312-326.
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#### **VIII. Legal Documents**

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## Appendix C Technical Appendix

### I. Incorporating Alternative Rates of Price Sensitivity to Commission in the Damages Model

1. My damages model can be easily modified to allow for various sensitivities of price to commission. Define sensitivity rate,  $\gamma$ , as:

$$\gamma = \frac{(p_2 - p_1)}{(\tau_2 p_2 - \tau_1 p_1)}$$

E. 1

2. This is one measure of sensitivity of price to commission and represents price change as a percentage of change in the \$ commissions per transaction. Note that when the number of apps is high, an implication of my model would be that  $\frac{(p_2 - p_1)}{(\tau_2 p_2 - \tau_1 p_1)} \approx 1$ . This follows from substituting for  $p_2$  and  $p_1$ , in E. 1 above, from E.2 in the Appendix F of the Rysman Opening Report and fixing  $n$ . Introducing the free parameter  $\gamma$  allows me to relax this implication of my model and to incorporate sensitivity rates below 1. For example, if I set  $\gamma = 0.911$  then,<sup>1</sup> from E. 1, price under  $\tau_2$  can be solved as:  $p_2 = p_1 \frac{(1 - 0.911\tau_1)}{(1 - 0.911\tau_2)}$ , or more generally

$$p_2 = p_1 \frac{(1 - \tau_1 \gamma)}{(1 - \tau_2 \gamma)}$$

E. 2

3. I assume that prices are determined according to E. 2. Given the prices, firms make entry decisions as in my damages model.

4. As previously, the percentage overcharge to consumers due to the higher commission or lower Play Points is determined by the following formula:

$$\% \text{ overcharge} = \frac{(1 - t_{B_2})p_2 - (1 - t_{B_1})p_1}{(1 - t_{B_1})p_1}$$

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<sup>1</sup> This is Dr. Singer's pass-through estimates. See Singer Merits Report, p. 138.

E. 3

5. Here  $p_1$  is recovered from the data while  $p_2$  is solved for using E. 2.

6. In Appendix F of Rysman Opening Report, I show that the total welfare effect (in \$) due to a lower commission and higher Play Points in the but-for world is represented as:

$$\Delta y = y \times \left[ \frac{p_1(1 - t_{B1})}{p_2(1 - t_{B2})} \frac{n_2^{\rho-1}}{n_1^{\rho-1}} - 1 \right]$$

E. 4

7. Substituting for  $n_2$  and  $n_1$  from the free entry condition (*i.e.*, setting profits, from E.3 in Appendix F of Rysman Opening Report, to zero to solve for the number of apps), I obtain:

$$\Delta y = y \times \left[ \left[ \frac{p_1(1 - t_{B1})}{p_2(1 - t_{B2})} \right]^\rho \left[ \frac{(1 - \tau_2)p_2 - c}{(1 - \tau_1)p_1 - c} \right]^{\rho-1} - 1 \right]$$

E. 5

8. I use E. 5 above to calculate total welfare effects. For comparison, in my workpapers, I provide welfare effects using Dr. Singer's and Dr. Leonard's pass-through rates.<sup>2</sup>

## II. Extension of The Damages Model with Heterogeneity

9. I start with my baseline damages model but assume that there is a large pool of apps such that each developer does not internalize the effect of their price on price index.<sup>3</sup> I also explicitly allow for heterogeneity across firms.

10. The utility function can be written as:

$$u = \left( \int_{\omega \in \Omega} (a(\omega)q(\omega))^{1/\rho} d\omega \right)^\rho$$

---

<sup>2</sup> See Rysman Workpapers.

<sup>3</sup> Dr. Leonard also agrees that “[w]hen the number of firms on the market  $n$  and consumer budget  $y$  is large, the model's predicted market outcomes with more and less relaxed assumptions are very similar.” See Leonard Report, footnote 14.

E. 6

11. Where the set  $\Omega$  represents the mass of the goods and  $\omega$  indexes a good (e.g. app). Following similar derivations as in my baseline model, consumer's demand for good  $\omega$  is:

$$q(\omega) = \frac{y}{1 - t_B} \times \frac{(a(\omega)\bar{p})^{\frac{1}{\rho-1}}}{p(\omega)^{\frac{\rho}{\rho-1}}}$$

E. 7

12. The price index is:

$$\bar{p} = \left( \int_{\omega \in \Omega} \left[ \frac{p(\omega)}{a(\omega)} \right]^{\frac{-1}{\rho-1}} d\omega \right)^{1-\rho}$$

13. As in my baseline model, apps first make entry decisions and then set the prices. Each app,  $\omega$ , is associated with its quality  $a(\omega)$  and marginal cost  $c(\omega)$ . After entering the app store, each app maximizes profits conditional on  $a(\omega)$  and  $c(\omega)$ . This leads to the following first order condition for profit-maximization:

$$(1 - \tau)p(\omega)^{\frac{-\rho}{\rho-1}} = \frac{\rho}{\rho - 1} p(\omega)^{\frac{-\rho}{\rho-1}-1} ((1 - \tau)p(\omega) - c_i)$$

14. The optimal price is:

$$p^*(\omega) = \frac{\rho c(\omega)}{1 - \tau}$$

E. 8

15. In equilibrium, there is some equilibrium distribution of quality and marginal costs which determines distribution of prices and quantities. The equilibrium is characterized by the number of firms,  $n$ , and a distribution of quality and marginal costs,  $\mu(a, c)$ , over a space  $\Xi$ . Let  $\xi = (a, c)$ . In such an equilibrium, the price index is given by:

$$\bar{p} = \left( \int_{\xi \in \Xi} \left[ \frac{p(\xi)}{a(\xi)} \right]^{\frac{-1}{\rho-1}} n\mu(\xi) d\xi \right)^{1-\rho}$$

E. 9

16. The expected profit of a firm at the point of making an entry decision is obtained by substituting for the equilibrium prices from E. 8 and equilibrium distribution of quality and marginal costs in the firm's profit function:

$$\frac{(1-\tau)(\rho-1)y}{(1-t_B)\rho n} \times \frac{\left[\frac{a(\omega)}{c(\omega)}\right]^{\frac{1}{\rho-1}}}{\int_{\xi \in \Xi} \left[\frac{a}{c}\right]^{\frac{1}{\rho-1}} \mu(\xi) d\xi} - F$$

E. 10

17. Substituting equilibrium  $q(\omega)$  in E. 6, consumer welfare can be written as:

$$V = n^{\rho-1} \times \frac{(1-\tau)y}{(1-t_B)\rho} \left( \int_{\xi \in \Xi} \left[\frac{a}{c}\right]^{\frac{1}{\rho-1}} \mu(\xi) d\xi \right)^{\rho-1}$$

E. 11

18. When there is complete unpredictability, in equilibrium, the expectation of  $\left[\frac{a(\omega)}{c(\omega)}\right]^{\frac{1}{\rho-1}}$  from individual developer's perspective is  $\int_{\xi \in \Xi} \left[\frac{a}{c}\right]^{\frac{1}{\rho-1}} \mu(\xi) d\xi$ . Using this in the E. 10, and using free entry condition, which implies that firms enter such that their expected profits equal zero, the equilibrium number of apps is:

$$n = \frac{(1-\tau)(\rho-1)y}{(1-t_B)\rho F}$$

E. 12

19. E. 12 is very close to E.4 in the Appendix F of Rysman Opening Report which is equal to this value plus  $1/\rho$ . Since  $\rho \geq 1$  the two models differ by at most one firm. This also coincides with the predicted equilibrium number of apps in my baseline model under the assumption that the number of apps is large enough such that individual firms don't consider the effect of their prices on the price index.<sup>4</sup>

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<sup>4</sup> To show that my baseline model generates the same equation, substitute price from footnote 7 of Appendix F of Rysman Opening Report into E.3 from Appendix F of Rysman Opening Report, equate to 0, and solve for  $n$ .

20. Under complete unpredictability, the variety damages (under the assumption of complete price stickiness) and total welfare damages are, respectively:

$$\Delta y = y \times \left( \left[ \frac{(\rho(1 - \tau_2) - (1 - \tau_1))(1 - t_{B_1})}{((\rho - 1)(1 - \tau_1))(1 - t_{B_2})} \right]^{\rho-1} - 1 \right)$$

E. 13

$$\Delta y = y \times \left[ \left( \frac{(1 - \tau_2)(1 - t_{B_1})}{(1 - \tau_1)(1 - t_{B_2})} \right) \times \left( \frac{(1 - \tau_2)(1 - t_{B_1})}{(1 - \tau_1)(1 - t_{B_2})} \right)^{\rho-1} - 1 \right]$$

E. 14

21. These expressions are the same as in my baseline model under the assumption that number of apps is large enough such that individual firms don't consider the effect of their prices on the price index.<sup>5</sup>

22. Hence, under the assumption of complete unpredictability, for my purposes, it does not matter whether I start with a model that accounts for quality and marginal cost heterogeneity in the population or whether I start with the “aggregate” or “average” model that I used in my opening report.

### III. SSNIP Threshold With Free Transactions

23. I start from the inequality in Rysman Opening Report, Appendix F ¶ 49 but add an additional marginal cost  $C_{\text{Free}}$  for a “free transaction” to distinguish from the marginal cost of paid transactions  $C_{\text{Paid}}$  and letting  $Q_2$  be the quantity of free transactions to distinguish from paid transactions  $Q_1$ . Let  $T^{**} = (1.1\tau^* - 0.9t_B^*)$ , and  $T^* = (\tau^* - t_B^*)$ . The HM will raise price by a SSNIP if:

$$(T^{**}p^{**} - C_{\text{Paid}})Q_1^{**} - C_{\text{Free}}Q_2^{**} > (T^*p^* - C_{\text{Paid}})Q_1^* - C_{\text{Free}}Q_2^*$$

$$C_{\text{Paid}}\Delta Q_1^* > T^*p^*Q_1^* - T^{**}p^{**}Q_1^* + T^{**}p^{**}\Delta Q_1^* - C_{\text{Free}}\Delta Q_2^*$$

$$C_{\text{Paid}} > \frac{T^*p^*Q_1^* - T^{**}p^{**}Q_1^* + T^{**}p^{**}\Delta Q_1^*}{\Delta Q_1^*} - C_{\text{Free}} \frac{\Delta Q_2^*}{\Delta Q_1^*}$$

---

<sup>5</sup> To show that my baseline model generates the same equations, use price from footnote 7 of Appendix F of Rysman Opening Report to arrive to counterparts of E.9 and E.10 in Appendix F of Rysman Opening Report.



$$C_{\text{Paid}} > \frac{T^{**}p^{**}\frac{\Delta Q_1^*}{Q_1^*} - T^{**}p^{**} + T^*p^*}{\frac{\Delta Q_1^*}{Q_1^*}} - C_{\text{Free}}\frac{\Delta Q_2^*}{\Delta Q_1^*}$$

$$C_{\text{Paid}} > \frac{T^{**}p^{**}\epsilon_{Q,p} - \frac{(T^{**}p^{**} - T^*p^*)p^*}{p^{**} - p^*}}{\epsilon_{Q,p}} - C_{\text{Free}}\frac{\Delta Q_2^*}{\Delta Q_1^*}$$

To get the equation in the body of the report, let  $-\frac{\Delta Q_2^*}{\Delta Q_1^*} = \textit{Diversion}_{\textit{Paid to Free}}$ , and note that the first term on the right-hand side is the marginal cost threshold in E.15 of Appendix F in my Opening Report.

**Appendix D****Android Smartphone Device Unit Sales by OEM****Exhibit D.1****Android Smartphone Device Unit Sales by OEM Worldwide, 2016 - 2021**

<b>Company</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Samsung	34.57%	35.94%	34.61%	34.54%	32.31%	32.00%
Xiaomi	1.40%	4.46%	8.20%	10.10%	13.80%	16.55%
Transsion	2.14%	3.41%	4.64%	4.98%	7.71%	9.75%
OPPO	2.60%	3.69%	4.13%	6.08%	6.91%	7.87%
vivo	0.99%	2.26%	3.02%	5.14%	6.88%	6.78%
realme	0.00%	0.00%	0.57%	2.78%	5.03%	6.36%
Lenovo	5.64%	5.89%	4.75%	4.64%	4.25%	6.00%
TCL	3.88%	2.23%	2.05%	1.99%	1.63%	1.93%
OnePlus	0.26%	0.29%	0.49%	0.60%	0.69%	1.23%
HMD	0.00%	1.05%	2.04%	1.49%	1.02%	1.23%
Huawei	6.92%	6.65%	9.92%	9.47%	6.64%	1.21%
LG Electronics	6.69%	6.60%	4.74%	3.58%	3.11%	1.00%
ZTE	4.00%	3.24%	1.18%	0.79%	0.70%	0.89%
Google	0.22%	0.41%	0.56%	0.84%	0.47%	0.55%
Sharp	0.38%	0.40%	0.53%	0.50%	0.53%	0.51%
Kyocera Group	0.50%	0.54%	0.41%	0.28%	0.32%	0.43%
Sony	1.79%	1.62%	0.97%	0.48%	0.37%	0.36%
BLU	0.91%	0.66%	0.51%	0.26%	0.35%	0.35%
Fujitsu	0.22%	0.26%	0.23%	0.29%	0.35%	0.31%
Wiko	0.78%	0.82%	0.75%	0.45%	0.38%	0.27%
Honor	0.71%	0.85%	2.21%	2.32%	1.50%	0.24%
Hisense	0.27%	0.47%	0.31%	0.28%	0.20%	0.19%
Mobicel	0.34%	0.29%	0.40%	0.22%	0.26%	0.13%
Micromax	1.40%	0.78%	0.79%	0.12%	0.05%	0.09%
Lava	1.07%	0.72%	0.55%	0.26%	0.11%	0.08%
Cherry Mobile	0.45%	0.43%	0.43%	0.27%	0.11%	0.07%
ASUS	1.87%	1.49%	1.10%	0.53%	0.16%	0.07%
Coolpad	0.63%	0.38%	0.20%	0.25%	0.11%	0.03%
HTC	1.48%	0.69%	0.19%	0.07%	0.03%	0.02%
Q-Mobile (PK)	0.72%	0.68%	0.29%	0.10%	0.03%	0.01%
Others	17.16%	12.80%	9.22%	6.31%	3.99%	3.49%
<b>TOTAL</b>	<b>83%</b>	<b>87%</b>	<b>91%</b>	<b>94%</b>	<b>96%</b>	<b>97%</b>

Source: IDC, "IDC Quarterly Mobile Phone Tracker, 2021Q4 Historical Release," February 11, 2022.

**Exhibit D.2**  
**Android Smartphone Device Unit Sales by OEM U.S., 2016 - 2021**

<b>Company</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Samsung	38.81%	39.75%	42.37%	40.78%	47.20%	49.50%
Lenovo	3.87%	5.72%	10.10%	10.84%	11.63%	16.92%
TCL	9.73%	5.51%	8.41%	11.23%	8.55%	8.70%
LG Electronics	20.84%	22.68%	22.01%	19.49%	18.72%	4.89%
Google	1.26%	2.18%	3.53%	5.53%	2.55%	3.77%
OnePlus	0.61%	0.67%	0.91%	1.25%	1.03%	3.44%
BLU	1.76%	1.82%	1.90%	1.02%	1.83%	2.19%
ZTE	13.34%	15.30%	6.17%	2.18%	1.06%	0.51%
Coolpad	1.94%	1.64%	1.38%	1.85%	1.16%	0.27%
HTC	3.41%	1.04%	0.25%	0.07%	0.00%	0.00%
Others	4.42%	3.68%	2.97%	5.76%	6.25%	9.81%
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: IDC, “IDC Quarterly Mobile Phone Tracker, 2021Q4 Historical Release,” February 11, 2022.

# **Exhibit I1**

## **Public Redacted Version**

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**EXHIBIT I**

**UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA**

**IN RE GOOGLE PLAY STORE  
ANTITRUST LITIGATION**

Case No. 3:21-md-02981-JD

Judge: Hon. James Donato

**EXPERT REPORT OF MATTHEW GENTZKOW  
NOVEMBER 18, 2022**

**NON-PARTY HIGHLY CONFIDENTIAL – OUTSIDE COUNSEL EYES ONLY**

**Exhibit  
PX 2749**

downloads, the number of new apps available<sup>172</sup> and the revenues of app developers.<sup>173, 174</sup> These dimensions of quantity interact through positive spillovers (what economists call “indirect network externalities”). Increasing the base of users who own Android devices expands the market for apps and thus catalyzes app development. Increasing the number of available new apps makes purchasing an Android device more attractive to users. Together, these trends represent a dramatic expansion in output on many dimensions.

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<sup>172</sup> The large decrease in the number of new apps published in 2018 is likely a result of the European General Data Protection Regulation (GDPR), which came into effect in May 2018, Google “cleaning out” Google Play, and Google updating its developer policy to ban a wider variety of apps. Rebecca Janßen *et al.*, “GDPR and the Lost Generation of Innovative Apps,” *NBER Working Paper Series*, 2022, pp. 1-47; Sarah Perez, “Google Follows in Apple’s Footsteps by Cleaning Up Its Play Store,” TechCrunch, July 27, 2018, <https://techcrunch.com/2018/07/27/google-follows-in-apples-footsteps-by-cleaning-up-its-play-store/>, accessed August 15, 2022.

<sup>173</sup> Other metrics of quantity and quality have also increased, such as: (i) the number of worldwide (excluding China) app users browsing Google Play, which has grown from [REDACTED]; and (ii) the number of U.S. app developers, which has grown from approximately 228 thousand in April 2015 to 621 thousand in June 2021 (I am not aware of any data containing numbers of worldwide (excluding China) developers over time). GOOG-PLAY-001047926; GOOG-PLAY-007038600.

<sup>174</sup> **Exhibits 2, 7, 8 and 9** rely on Google’s Worldwide data. My conclusions are robust to relying instead on Google’s App-level spend data for U.S. consumers or Google’s App-level spend data for U.S. developers. “App-Level Spend Data, U.S. Consumers 2012-2020,” GOOG-PLAY-005535886; “App-Level Spend Data, U.S. Consumers 2021,” GOOG-PLAY-010801688; “App-Level Spend Data, U.S. Developers 2012-2020,” GOOG-PLAY-005535885; “App-Level Spend Data, U.S. Developers 2021,” GOOG-PLAY-010801689.



607. Plaintiffs’ analyses of the but-for world are further flawed because they do not account for the way Google’s conduct or the conduct of most other platform participants would adjust in the but-for world. As discussed in **Section III** above, changing contracts, terms, rules, or incentives on one side of a platform can create large and often counter-intuitive spillover effects on other sides. Changes that might benefit one group of participants on the platform can harm other groups of participants. A change that lowers prices on one side of a platform need not be associated with an increase in total output, quality, or overall welfare. Plaintiffs’ experts largely ignore these interdependencies. In a but-for world where Google’s ability to earn revenue through service fees was reduced or eliminated, Google would have less incentive to take costly steps that expand output in the Android ecosystem and make Android a more effective competitor to iOS, including by offering OEMs and MNOs attractive revenue sharing agreements, licensing valuable intellectual property for free, investing in safeguarding security and improving the Android user experience, providing high-quality service and incentives to developers, and developing frameworks to address key collective action problems. The result could be higher prices, lower quality, and lower output in the Android ecosystem, and reduced welfare for many users and app developers.
608. One of the papers Dr. Rysman relies on for his conclusions establishes that “[f]actors reducing entry costs deliver large welfare benefits, while factors hindering entry ... can deliver substantial welfare losses.”<sup>1045</sup> Changes in conduct like those discussed above could hinder entry, both by raising its cost and by reducing its benefits. Dr. Rysman only considers the impact of his assumed lower service fees in the but-for world and does not discuss the ways in which eliminating the challenged conduct could reduce entry.<sup>1046</sup>
609. Moreover, Dr. Rysman’s model is a *monopoly* app store model even in the but-for world. That is, Dr. Rysman’s model assumes that Google Play is the only app store available to consumers in both the actual and but-for worlds.<sup>1047</sup> Dr. Rysman’s model is thus not

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<sup>1045</sup> Rebecca Janßen *et al.*, “GDPR and the Lost Generation of Innovative Apps,” *NBER Working Paper Series*, 2022, pp. 1-47, at p. 37.

<sup>1046</sup> Rysman Report, Section VII.C.

<sup>1047</sup> Rysman Report, Appendix F, ¶¶ 1-4.

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